# ELECTRICAL REVIEW

ILLUSTRATED.

A WEEKLY JOURNAL OF

## Electric Light, Power, Telephone, Telegraph and Scientific Progress.

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### New Rules of the Telephone Company.

A new rule in relation to telephoning to a telegraph office has just been put in operation by the Southern New England Telephone Company. The rule is to this effect: Some time since the Bell Telephone Company made a contract with the Western Union Telegraph Company, whereby the former should place an instrument in the various offices of the latter, to be used exclusively for sending a message to the office of the telegraph company, said message to be sent away. The terms of the contract were to the effect that the telephone company should receive a certain percentage for every message sent to the telegraph office through the telephone. Not only have the telephones been used for this purpose, but for everything else. In consequence of this, the telephone company have notified the telegraph company that hereafter 10 cents will be charged for every message going through the telephone. The difficulty is now being considered by the two companies, and the matter, it is thought, will be amicably settled.

### Electrical Progress in China.

The news reaches us says the London *Electrical Engineer* that a telephone has been put up at the palace of the "Seventh Prince," This is encouraging news from the capital of China, though telephones are not new to Peking, as several short lines have been set up experimentally within the past seven years. They have even been used at the Great Wall of China (the very existence of which wall was disputed not long ago), as well as in the Buddhist temple of the Azure Cloud, some few leagues to the north of the capital. The fact that the telephone is making its way into the palaces constitutes a distinct step in advance, and it is to be hoped they will speedily find favor in the eyes of the *literati*; among the mercantile population of the Southern ports they have long been accepted as useful aids to commerce. Electric lighting is likely to have a grand future in Hong Kong now that regularity of supply can be depended upon, and before long the system is certain to spread to all the open ports. It is matter for regret that the uncertainty and oft-repeated failures which attended the earlier installations gave rise to so much delay, for Chinese merchants are always willing to embark capital in any undertaking which can be made to pay a dividend, when they are not interfered with by the mandarin element. We venture to say that those who knew China 20 years ago are now agreeably surprised to find our Western inventions have begun to take root even to the trifling extent already witnessed, for as a rule, the progress made, though slow, is sure. For all that, we should like to see a little more life put into affairs out there, for we have proof that vital changes may be rapidly effected, without danger to the country or the individual, when we turn to China's enterprising neighbors, the Japanese, regarding whom there were such dismal prophecies a few years ago. It was freely asserted then that Japan was going ahead at a pace which could not last, but the change, stupendous though it undoubtedly was, has been permanent and beneficial in the highest degree.

### The Storage Battery Work of the Mutual Electric Manufacturing Company.

The excellent and progressive electrical work done in the past year by the Mutual Electric Manufacturing Company, of Brooklyn, N. Y., is worthy of the special mention the REVIEW is pleased to give in this issue. For more than a year past the chief men of the company, Mr. Theodore E. Otis, president and general manager, and Mr. Edward R. Knowles, electrical engineer, have been quietly perfecting a storage battery, as well as arc lighting and "combination," system which is now presented to the general public in a very interesting and attractive catalogue.

In addition to perfecting the electrical apparatus and completing the smallest details, the company has enlarged its already large factory facilities in Graham street, Brooklyn, and is now in shape to handle the immense business that they anticipate, and which the increasing demand for electric light is sure to bring them. Electrician

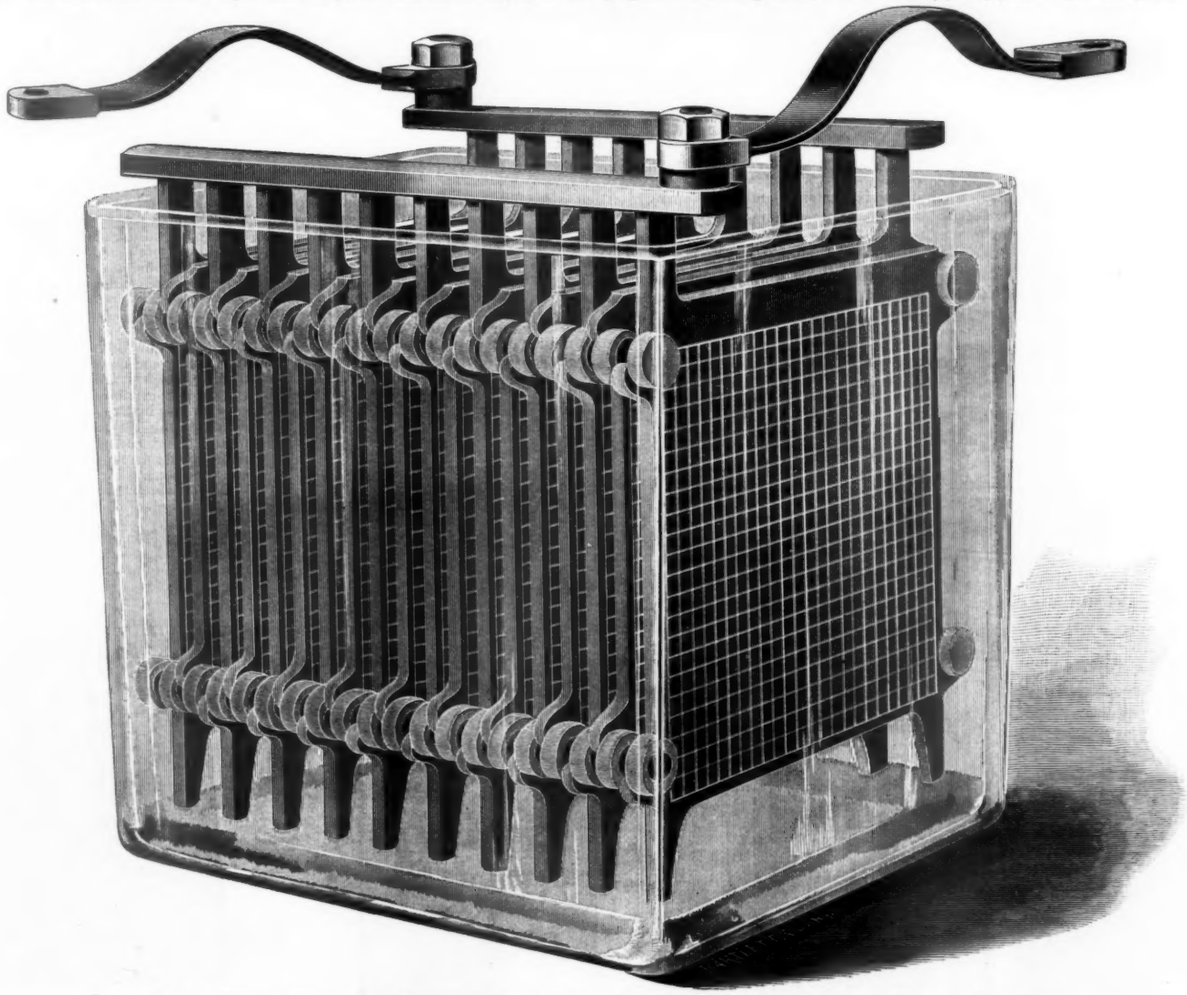

FIG. 1.—STORAGE BATTERY OF MUTUAL ELECTRIC MANUFACTURING COMPANY OF BROOKLYN.—KNOWLES PATENT.

Knowles has made a special work of developing the storage battery for electric lighting, along with which he has perfected and improved his dynamo and apparatus generally for generating and controlling the electric current. The company announces that it is incorporated for the manufacturing of all kinds of electrical apparatus, and having practically developed several of its most valuable devices presents them to the public confident that every purchaser and user will be highly satisfied. Mr. Knowles is the inventor of all the work, and it is due to the energy and faith of the president, Mr. Otis, that the work has been so successfully and intelligently carried to completion.

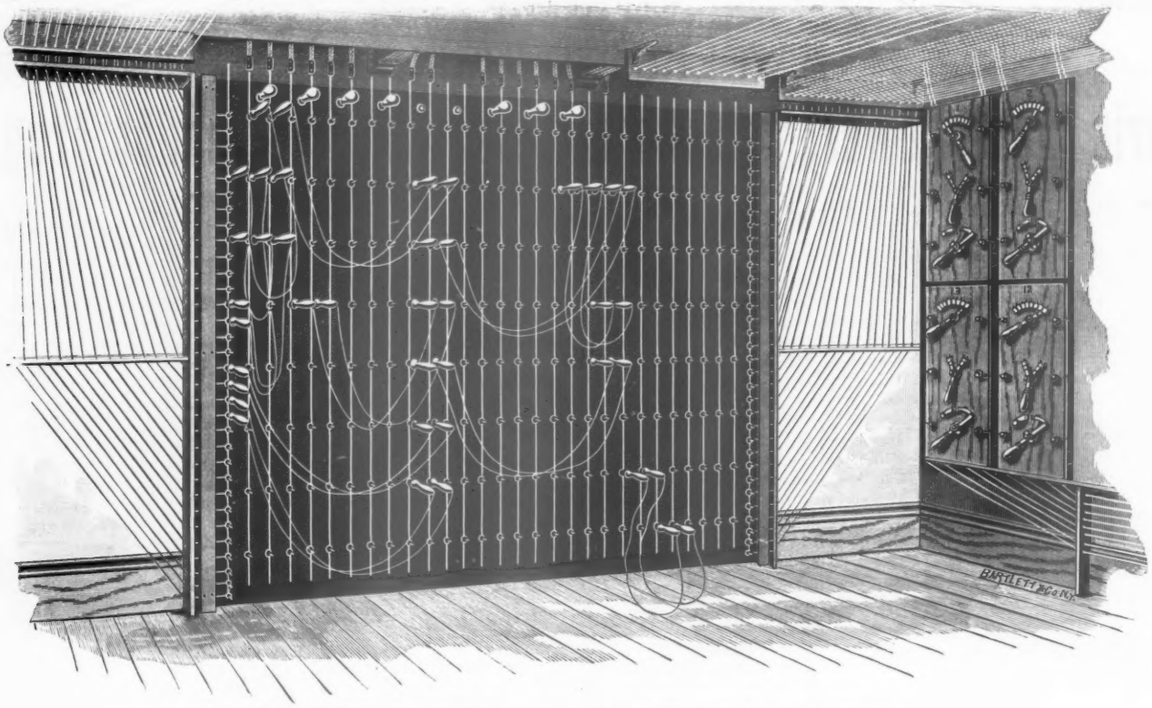

FIG. 2.—BATTERY STATION SWITCHBOARD.—MUTUAL ELECTRIC MANUFACTURING CO.

In Fig. 1 we present a view of the improved Knowles storage battery, in which the inventor claims that he has been enabled to overcome many former difficulties. The improvements claimed are, briefly, a superior inoxidizable alloy and improvements in the mechanical construction of the battery, by means of which all buckling of the plates, scaling, falling out of the plugs of active material and sulphating is avoided, and the desirability and efficiency of the battery greatly increased. The battery has the minimum of inactive material, and the company assert that it has the maximum output of current for any battery of its size in the market. The standard cell is shown in Fig. 1. This is known as the type E cell and is the size for which there is the most demand, although batteries of any size are furnished as desired. It is made up of 19 plates (10 negatives and 9 positives). Its general appearance is shown in the cut. Its internal resistance is very low, about 0.015 ohms, and its electrical capacity, varying with the rate of discharge, is from 125 to 200 ampere hours. Its weight is 25 pounds; electromotive force, 2 volts; maximum current, 30 amperes; floor space occupied, 8 inches by 9 inches; height, 9 inches. The cell is furnished in two forms, one in glass jars for stationary installations, and the other in rubber or composition boxes, with covers for motive purposes.

The idea of distributing electricity over large areas economically and satisfactorily is a leading one with the Mutual Company. This system consists generally of a central generating station, where are located the necessary electric generators or sources of electric energy, which may be of any approved form, suitable for the charging of storage batteries. Here also are located the boilers and engines and all the apparatus used in controlling and governing the distribution of the electric current. At this point all the distributing circuits center at a common switch-board and the automatic regulators and safety devices are located. From this point the charging circuits are carried to the places where the storage batteries are located, which may be at any point where lights are needed and may be many miles distant from the generating station. The storage batteries are located wherever lights are desired, in any convenient position in the cellar of the buildings, or outside in the yards, or in fact any place in which it is most convenient to put them. At these points are located the necessary switches, indicators, and safety devices for controlling the charge and discharge of the storage cells, and from these points are carried the wires which connect with the electric lamps and distribute the electric energy to them whenever needed. Each building is also furnished with an electric meter which records the amount of current used, the same as gas is registered. When the charging of the battery has been accomplished, the battery is cut out from the charging circuit and each set then becomes a station in itself, isolated from and independent of all external help. This is a general outline of this system of lighting, subject to such modifications as circumstances may render necessary. This system has now been in operation for more than a year and has successfully met every test to which it has been subjected. A station with capacity of 4,000 lights is in constant use in Brooklyn. The important details of the system are illustrated, each figure being named beneath. The automatic regulator is shown on the dynamo cut, and is a simple and novel device, by means of which the current supplied to the lamps is kept perfectly even and uniform, whether there be one or the full complement of lamps in circuit, varying automatically the action of the dynamo with every fluctuation of the circuit, keeping the current constant, and varying the power exactly in proportion to the work done. There are two forms of regulators made—one acting at the dynamo to keep the current in the circuit constant under all changes of resistance, and the other (Fig. 3) acting independent of the dynamo and operating at any point of the circuit to keep a constant circuit resistance under all variations of current.

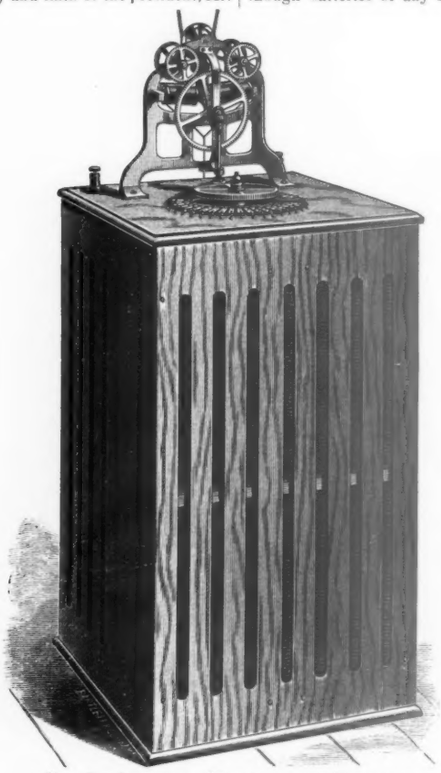

FIG. 3.—AUTOMATIC RHEOSTAT AND REGULATOR.

FIG. 5.—WALL REGULATOR FOR DYNAMO.

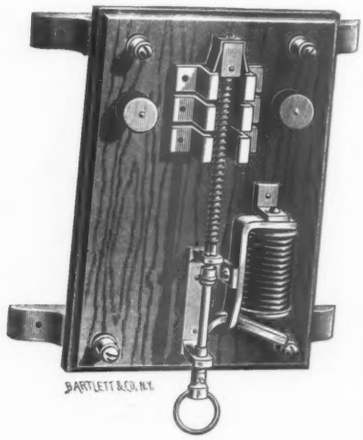

FIG. 4.—SAFETY CUT OUT FOR BATTERY.

### Overhead Wires all Right when Properly Put Up.

Speaking in defence of the overhead wires, Philip N. Jackson, the secretary of the Newark Electric Light Company, says: "Electric lighting is a great invention; the dangers that have attended its introduction do not compare with those from the adoption of gas, railroads and other great improvements. More people are smothered

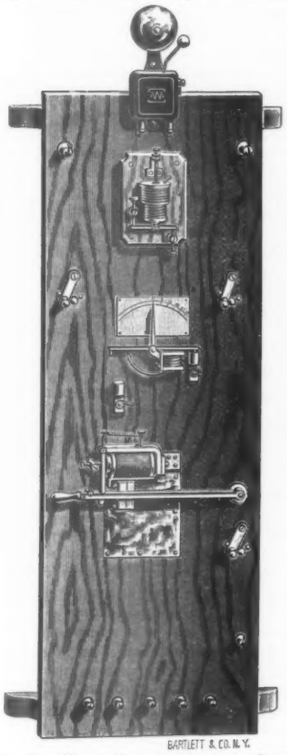


FIG. 6.—WALL REGULATOR AND SAFETY CUT-OUT FOR DYNAMO.

by illuminating gas in one year in New York than are killed by all the electric light wires in the United States. More people are killed by railroads in one week than have been by our wires since the beginning, and even the horse cars take a much larger number of lives.

"The objections urged against wires in

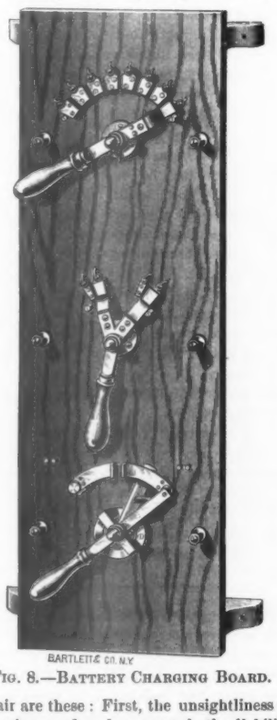


FIG. 8.—BATTERY CHARGING BOARD.

the air are these: First, the unsightliness of the wires and poles; second, the liability to damage during storms; third, the interference with fire alarm and other wires; fourth, the danger to persons from coming in contact with them, and fifth, the damage liable to result to trees and buildings when the wires are not properly protected. It is claimed for the subway that it would remove all of these troubles, but I am convinced that it would remove one and introduce other elements of danger.

"Unsightly poles and badly strung wires would disappear, of course, but the danger to individuals would take new shape. There would be underground explosions and leaks in the streets that would charge the ground. The danger to persons and horses, because of the larger area of territory that would be electrified, would be increased. The paving would have to be torn up constantly to repair damages. No one could come in contact with the wires, of course, but something worse would result. You can see the wires now and avoid possible danger, but if they were underground their power would be invisible. One might walk unconsciously upon a perfect battery of electricity. Some damage has occurred to property and trees in this city from the proximity of wires, but $100 would probably pay for it all. The accidents were not due to overhead wiring, but to bad overhead wiring.

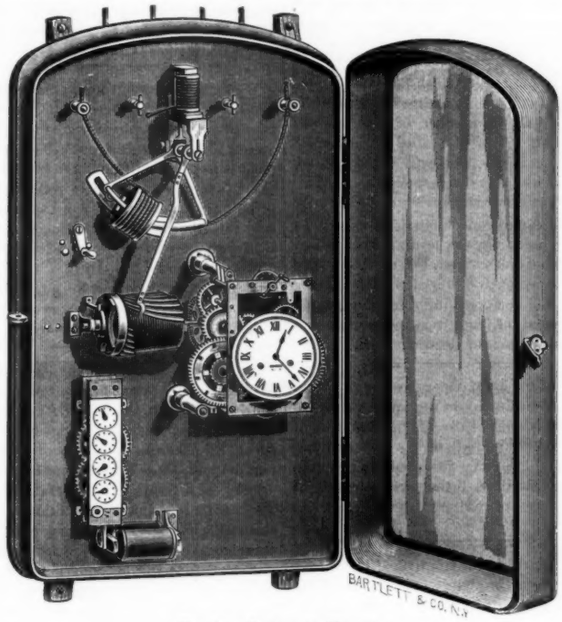


FIG. 7.—ELECTRIC METER.

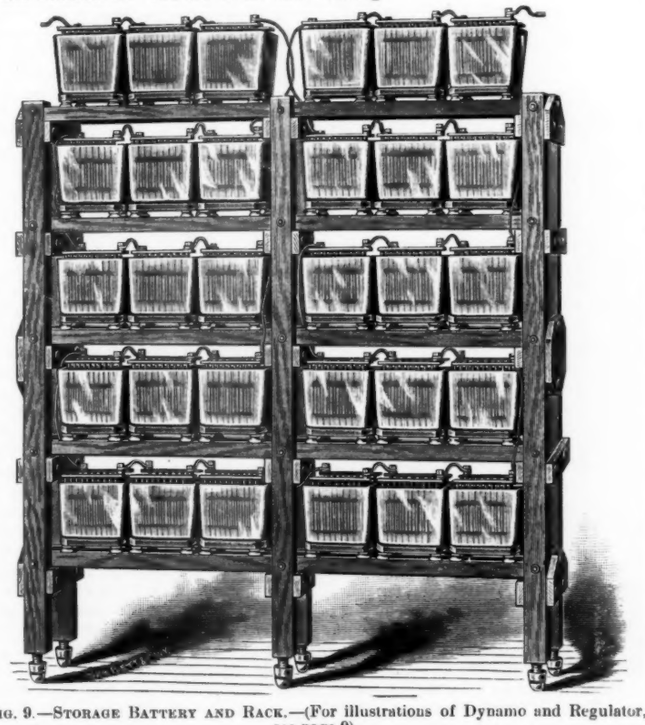

FIG. 9.—STORAGE BATTERY AND RACK.—(For illustrations of Dynamo and Regulator, see page 9).

**Albany, N. Y.**—The Central New York Electric Light and Power Company is formed by Alexander Van Vleck, Russell B. Wheeler and George Barrow. They propose to manufacture and furnish electricity for illuminating purposes and for power to individuals and corporations. The company will locate at Skaneateles, Onondaga county. The capital is $100,000.

**Saratoga, N. Y.**—The Saratoga Electric Railway Company, to construct and operate an electric railroad, two and one-quarter miles in length, in Saratoga Springs. The capital stock is $50,000; directors, J. M. Burt, of Bennington, Vt., William B. Ferguson, of Boston, and John L. Butman, Caleb W. Mitchell, George W. Morton, James H. Pardue and Denman Vail, all of Saratoga.

**Brooklyn, N. Y.**—The Bedford Electric Power and Lighting Company is formed by Henry E. Oakley, William A. Ainsworth, J. H. Mason, V. Smith and Henry Lotz. They propose to form a corporation to furnish to and operate electric light systems in the different cities, towns and villages of the state and in other states. They will locate in the city of Brooklyn. The capital stock is $50,000.

**Galion, O.**—The Galion Electric Carbon Company, Galion. Capital stock, $25,000.

**Philadelphia.**—The Woodstown Electric Light, Heat and Power Company; capital, $25,000.

**Auburn, N. Y.**—The Owasco Lake Electric Railway Company at Auburn was granted a franchise.

**Washington, D. C.**—The Washington Street Railway Company has been chartered with a capital of $60,000. Work on the line will begin at once.

**Hornellsville, N. Y.**—The American Illuminating Company, of Hornellsville, filed a certificate of an increase of their capital stock from $42,000 to $46,200.

**Peoria, Ill.**—Light, Heat and Power Company, of Peoria; capital, $50,000; to manufacture gas machines. Incorporators: Jos. Elder, N. C. Dougherty, J. N. Whelpley.

**Chicago, Ill.**—The Connolly Motor Company; to buy, sell and operate street railway motors; capital stock, $2,500,000; incorporators, Charles Bonner, William F. Swan and Francis S. Bates.

**Cincinnati, O.**—The Cincinnati Electric Light and Power Company, with a capital stock of $500,000, was incorporated by Aaron B. Champion, E. Cort. Williams, Archibald Stuart, Eugene Wambaugh and Waldo P. Adams.

**Quincy, Ill.**—The Quincy Motor and Carrying Company, of Quincy; to establish and operate railways, and operate them by electricity or other motor power. Capital $100,000. Incorporators: E. H. Osborn, J. N. Duker and Q. T. Dickason.

**Joliet, Ill.**—The Joliet & Lockport Electric Street Railway Company; location, Joliet; to operate a street railway by horse or electric motor. Capital stock, $50,000. Incorporators: C. H. Bacon, John R. McDonald and A. L. Moody.

**San Francisco, Cal.**—The Pacific Telephone Company; the directors are Lloyd Tevis, George S. Ladd, Evans S. Pillsbury, W. F. Goad and W. C. Gibbs, of San Francisco, Samuel Hubbard, of Oakland, and W. H. Forbes, of Boston. The capital stock is $5,000,000, of which only $2,500 is subscribed.

**Schenectady, N. Y.**—The Mohawk Valley Electric Company, capital $200,000, to manufacture and use electricity for light, heat and power. The trustees are: William G. Schermerhorn, Albert Shear, E. Nott Schermerhorn, George A. Streeter, James A. Van Vorst, Simeon L. Phillips and Francis H. Leonard.

**Revere, Mass.**—The Revere Gas Company. Capital stock of $50,000. William W. Lowe, president; D. Morgan Crosby, treasurer. The company is organized for the purpose of making and selling gas for light and heat, and generating and producing electricity for light, power and heat.

**Lexington, Ky.**—The Citizens' Electric Light and Power Co.; capital, $100,000. The officers are: President, G. A. DeLong; secretary, W. H. Boswell; treasurer, J. W. Rodes; directors, G. A. DeLong, S. P. Kerr, J. D. Yarrington, W. H. Boswell, E. M. Norwood, J. W. Rodes and D. F. Frazier.

**Kansas City, Mo.**—The Pittsburgh Electric Light and Power Company; capital stock, $50,000. Directors, B. F. Hobert, of St. Louis, Mo.; C. E. Grannies, of New Haven, Conn.; A. E. Stillwell, C. H. Hammatt, of Kansas City, Mo., Frank Playter, B. H. Wilson, F. E. Doubleday, D. Ramsey, of Pittsburgh; J. M. Goff, of Walnut.

# ELECTRICAL REVIEW

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Once more it is claimed that a Denver, Colorado, inventor has discovered a chemical compound from which light, heat and power can be obtained at a cost much below that of electricity.

The probabilities are that the dogs operated and experimented upon by "expert electricians" did not die in consequence of shock, but because the autopsy on their quick remains was begun with a dissecting knife, and carried to the death. No one will care to take the responsibility of deadening a man's senses by electricity, with the possibility, nay, the probability, before him of resuscitation after burial.—*Howard, in N. Y. Press.*

The very interesting and instructive series of lectures delivered before the Electric Club during the past six months will be resumed again this fall, after the heated term.

The special train to the Niagara Falls Electric Light Convention is assured. The ride will last 13 hours, and will be through some of the attractive parts of the State, and will give the electrical travelers a pleasant day together.

The St. Louis Electrical Exposition promises to be a very interesting and comprehensive affair. A number of fine exhibits are assured. St. Louis is always "at home" on such occasions, and will no doubt see that her visitors are well treated.

In this day of consolidation it would not surprise us to see the leading storage battery companies "get together." Then instead of expensive litigation over patents, there would be opportunity for more rapid development of this very attractive and important branch of electrical work.

Some of the daily papers are amazed that the recent testimony in regard to killing by electricity is so decidedly against this element as a certain and safe means of destroying life. It will be very disappointing to the sensational writers, if they are deprived of the privilege of writing up an electrical execution.

The electric beam from the Eiffel tower lantern has a luminous intensity of about 55,000 candles. Catadioptric rings are arranged to make the light stronger and stronger as it travels from the tower, so that in clear weather its range—if not limited by the earth's curvature—should be 127 miles, with an intensity of 5,000,000 candles.

The electric light convention at Niagara Falls, N. Y., will come as a pleasant vacation these hot days to many hardworking electricians. The week that it may take them away from business will undoubtedly be profitably spent, not only in acquiring information, but also in enjoying a cooling at the most beautiful and interesting falls in the world.

A New York dog came in contact with a live electric light wire, and remained for nearly ten hours in a deathlike condition. Now that he has recovered, his owner is the proudest man in the city, and physicians are endeavoring to discover on what plan this canine is built. It is charged, we hear, by the believers in execution by electricity that the dog had been retained by the other side to prove the uncertainty of the effect of the electric current on animal life.

The New York *Sun*, in its usual able and emphatic style, is urging the celebration of the anniversary of the discovery of America by Columbus by a great International Exposition, to be held in New York City in 1892, and, "as a starter," announces that it is ready to give $10,000. Some two years ago a similar suggestion was made in these columns, and we now hope to see it successfully carried out. The electrical interests, we are sure, will take most active part, and will alone be able to present an exhibition that will surprise every one.

The announcement is made by the Southern New England Telephone Company that tickets will be demanded of persons using individual telephones who are not subscribers. This will be a blessing to subscribers. It has grown to be a habit with a great many people to use their neighbor's telephone without any regard for the trouble, worry and cost that the subscriber endures. To remedy the evil this company has issued the tickets. Subscribers will be compelled to demand them or be subjected to increased rates. The company has the good of its subscribers in mind when it enforces such a rule, for by cutting out non-subscribers the service will be made better for those who pay. It is surprising that the number of people who use a telephone and never pay is so large. The telephone is apparently looked upon as a public convenience, and quite often in the smaller cities a single telephone is expected to answer for the entire block. This is not only an injustice to the company but is also a great annoyance to the paying subscriber who from a generous idea of neighborly courtesy, is generally indisposed to refuse. The New England experiment will interest all the companies.

We do not think our new postmaster-general does himself any credit in attempting to cut down the rate for government telegrams to one mill a word. This government is not a mendicant, and can afford to pay a just price for services received. The former rate of one cent a word was certainly low enough, and if Mr. Wanamaker has really decided to cut the rate down to one mill he has placed himself in a very ridiculous position, one from which he will very likely have to recede if he expects any government telegraphing to be done.

The board of regents of the University of Michigan (Ann Arbor), have authorized a course of study in the university leading to the degree of Bachelor of Science in Electrical Engineering. This course will be parallel with those in civil, mechanical and mining engineering, with the same requirements for admission. In addition to special electrical courses, laboratory work, etc., complete tests of central electric light and power stations will be undertaken, and the student will be made acquainted with the best practice in electrical manufacturing and engineering by visits to places where such enterprises may be seen on a large scale.

### *WHEREIN LIES ECONOMY.*

The average person, uninformed on electrical matters, will say that he is waiting for some great invention to be made, whereby the electric light or the electrical distribution of power may be cheapened and brought within the reach of the general public; whereas the universal use of electricity in the immediate future rests but very little with the manufacturer, still less with the inventor. Electrical apparatus has already arrived at a state of perfection which can never be greatly improved from a mechanical standpoint, neither can its efficiency, as a force transformer, be increased more than 10 or 15 per cent. At the present time it rests almost wholly with the producers, that is, those who operate apparatus and control the methods which obtain in distributing stations, to say if the public shall be served more cheaply than it is to-day. This is not to be brought about by a more forceful application of the great stimulus of this age—direct competition; but by a more general and comparative study of the principles of economy which apply in every department of the industry, from the shovel to the lamp socket. As in other departments of human effort, this can only be obtained by each individual profiting by the experience of the whole fraternity. The truth of this principle as applied to all forms of industry, is shown by the prosperity of the various associations where producers meet for the interchange of ideas. In the electric lighting industry it is shown by the prosperity of the National Electric Light Association, the New York Electric Club, and the smaller societies throughout the country which have come into existence in compliance with the popular demand for the interchange of specific knowledge. Should, however, some fortunate individual devise some better way of obtaining electricity than our present method of cutting lines of magnetic force with conductors, for a time undoubtedly the burden of the labor would be thrown back upon the inventors, and the producers would find time to gather their energies for renewed efforts.

We still are of the opinion that no criminals will be executed by electricity. Some interesting testimony in this respect appears on another page.

### *THE EXHIBITION OF 1892.*

It would be well for all our manufacturers of electrical apparatus, machinery and supplies to keep this coming event (for we think it is sure to come and to this city) well before their minds. The time appears long but the world to-day is a busy one and the months roll away with a rapidity which astonishes the busy man when he stops work long enough to reflect. Almost before one can realize it, 1892 will be in view, and we trust our electrical brethren will be ready to show the sight seeing millions all their magnificent possessions. Let them see and at length comprehend the fact that electricity is the lever that Archimedes sighed for when he proposed to move the world. Let them see the great manifestations of this great force. Electric light companies can show the perfection which has been attained in the way of general and special illumination. Telephone companies can practically exhibit the completeness of their systems, both short and long distance. But the richest harvest of admiration will be garnered by the manufacturers of electric motors and motor systems. The possibilities for them are great.

In the present state of the art there is nothing whatever in the line of practical obstacles to prevent every piece of moving machinery in the exhibition buildings and grounds being operated by electric motors. Extravagant or Utopian this may seem, but the idea is quite feasible. More than that, it is quite probable that when one comes to consider the vast amount of power which will likely be called for, the interminable labyrinth of shafting, pulleys, countershafting and belts, and the great cost of all this, not to mention the enormous loss of power in such a system of transmission, one will be very apt to conclude that money can actually be saved by making the entire power plant of the exhibition electric. And can any of our readers give a rational objection which will be of an insurmountable nature? We think not.

Further still, what is to prevent the utilization of some of our comparatively near water-falls as the prime source of power? We see nothing in the way. Ten thousand horse-power could easily be brought into New York from distant points. Insulation is no obstacle. Give the manufacturers of the underground conductors the right to select the style and construction of the conduit, and we have no doubt they would gladly undertake the work and guarantee the safe and practicable transmission at a pressure of even 10,000 volts. At this pressure 1,000 amperes could be carried on quite a moderate conductor, and an all-metallic circuit would be attainable at a moderate cost.

There need be no trouble about the generators. They can be made to give the customary 1,100 volts, and the higher pressure for transmission obtained by means of large converters, to be again reduced at the confines of the exhibition grounds by ordinary converters for distribution and use at a pressure which will be entirely harmless. Where the consumers want continuous currents, motor-converters can be used, and thus all known systems of motors can be accommodated.

But the accomplishment of such a seemingly gigantic end can be brought about only by energetic and harmonious work on the part of the electric motor and generator manufacturers, together with those whose special field is underground conductors. Will they do it?

We shall be glad to hear from them, and put our shoulder to the wheel right along.

The only thing rendered certain by the long inquiry into the subject of execution by electricity in New York is that death by electricity is not yet sufficiently understood to be prescribed by law. Until this form of execution can be made as sure in action as that by hanging, shooting or the guillotine, it should not be adopted by any Government that claims to be humane.—*Philadelphia Inquirer.*

# ELECTRICAL NEWS.

## Boston, Chicago and Other Points.

### OUR CHICAGO LETTER.

**Electric Railway in Des Moines.**—A correspondent at Des Moines, Iowa, thinks there was never anything quite so nice (barring a new baby) as an electric railway. There was a horse-car road, finely equipped with new cars and fine horses, but the people would not ride. They preferred to walk rather than drag along at a slow pace over the heavy grades in the city. The road did not pay expenses. The system was changed to the Thomson-Houston electric system, and cars are now running on a track nearly five miles in length, with several branches, loaded to their full capacity, making six or eight miles an hour, up and down 10 per cent. grades, without overheating the journals or sweating the conductor. On one of the branches the other day there were nearly one hundred people on a car, the only connection between it and the power house three miles distant being a number two copper wire up in the air. That car with that load ran six miles an hour up ten per cent. grades, stopping and starting at any required point. The company have never had a dollar of repair to make on the road—none have been needed. The cars are always crowded, and the stock which was on the market at 25 cents on the dollar a short time ago is now hard to find at 150. The road is paying eight per cent on $400,000, and the operating expenses are less than for horse car lines. Hurrah!

**Struggle for Monopoly.**—The Brush Company claims the original right of patent in storage battery, as decided by the U. S. patent office in the struggle between 1882 and 1886, and at the September term of the U. S. Circuit Court in New York will bring suit against the Electrical Accumulator Company, of New York, and other concerns manufacturing storage batteries, in an effort to sustain the decision of the patent office. So says a correspondent at Cleveland. In view of the fact that there are many parties who would be seriously inconvenienced by a decision giving a battery monopoly to any one company, it is reasonable to suppose that a very hotly contested case will result.

**One Dead Dog.**—At Aurora, Ill., a humanitarian named Burke rescued a vagrant dog from a few of the city's brave defenders, who were practicing target shooting with indifferent success, and sacrificed the animal to electrical energy. Two copper pans filled with water stood under a frame so arranged that when the innocent victim was led to the fatal spot his fore feet were bathed in one pan while the hind feet were laved in the other. An electric light dynamo was put in motion, and a switch, which had been arranged before hand, was closed, sending a current to the bathing pan, through the dog into the laving pan, and home again. The dog was dead. Hereafter all canine vagrants arrested by the police of Aurora will be thus washed out of existence, and the city expects to save quite a little amount of money by stopping the waste of lead which has heretofore been no inconsiderable drain on the city treasury.

**A Big Chew for a Small Mouth.**—$65,000,000 is the capital stock of the "United States Vogelgrayphone and Electric Microphone Far Distance Speaking Instrument Company." Its president is E. W. Vogel, and its combined treasurer and secretary is Adolph Gray. There is no stock so far on the market, but that it beats the primary battery scheme as far as a tin trumpet does a pumpkin stalk for noise goes without saying. What investor with a wallet red-hot with anxiety for golden opportunity—a sort of Sinbad, the sailor, valley of diamonds chance—could give this proposition the cold shoulder? This is part of the stipulation: "Ten per cent. interest guaranteed upon each and every coupon presented through the Vogelgrayphone bank each and every year until the year 1901." The bank is not yet established, but there is tangible property. There is a line of about half a mile of thin iron and copper wire strung across some vacant property near Maywood station, and at either end of this line a building contains one of the U. S. V. and E. M. F. D. S. I. Company's instruments, which is to be patented by and by, and which will proceed at once to knock the spots off the telephone monopoly.

**After the Professor.**—At the last meeting of the City Council, Alderman Horn introduced an order looking to the speedy establishment of electric lights on the streets. The order pointed out that the appropriation for gas lamps for the current year was $60,000 less than it was last year, and that the prospect of getting a reduction in the price of gas was poor. Meanwhile the greater portion of the $300,000 appropiation for electric light plants was lying idle in the City Treasurer's hands. The order, therefore asked that City Electrician proceed at once to take the necessary steps toward beginning the lighting of the streets and alleys with electric light.

While the Aldermen rested the Mayor stated for the information of the Council that the Electrician had been for several weeks steadily engaged in the very work called for in the order.

And the Alderman, metaphorically speaking, sponged his slate by withdrawing the order, but the barber will keep on shaving.

**Club Reception.**—The return from the East of President Barton, was made the occasion of a very pleasant gathering of the boys at the club rooms on Wednesday evening. The assembly was a large one, and showed the interest and enthusiasm the members feel in club matters.

**Hyde Park Annex.**—The village Board of Trustees has not yet finally turned over the town to Chicago. In electrical parlance the joint is made, though not soldered and taped yet, but it will be in a very few days.

Meantime the matter of lighting the streets is on. Yesterday the board held a meeting and did much debating on the subject, Trustee Kinney called up Trustee Baird's resolution awarding the contract for lighting by electricity. This resolution proposed giving the contract for that portion, north of 47th street, to John R. Bensley at $61.15 per lamp per year; from 47th to 67th street to the Excelsior Company, at $71.55, and from 67th to 138th street to the Calumet Electric Company at $84.00. these being the bids of the parties named. Then there was considerable playing ball with resolutions, and amendments flew like sparks in a rail mill, until finally as a grand round up of the whole matter a reconsideration was had, and the electric light men given a rest.

**Wires.**—Geo. C. Bailey, of Roebling's Sons, tells me the Chicago house is doing a wonderful business in wires, the demand since the copper tumble having increased immensely.

**Thirst for Knowledge.**—Will McKinlock, of the Central Electric Company, tells me he keeps a man busy mailing the little brochure, "Arc Electric Light," which the firm recently issued. The new mail clerk can hardly keep up with requests which came from all ranks of people, electrical as well as non-electrical, and in the meantime the regular force is kept busy with regular orders.

Chicago, July 15, 1889. C. C. H.

### OUR BOSTON LETTER.

**For the St. John Exposition.**—It is announced that a special steamer of the International Line, the "Cumberland," will leave Boston Saturday, July 20th, for St. John, for the accommodation principally of those wishing to visit the St. John's Exposition. The start will be made from Commercial Wharf at 6 P. M., and a special rate of five dollars for the round trip has been made. The tickets are good to return on any steamer until October.

**A Paper by a Hyde Park Man.**—The *Record* says that Mr. F. A. Wyman, of Hyde Park, a prominent member of the Legislation, who did good work in securing the incorporation of the Electric Exchange, will read a paper at the Niagara Falls Convention of the National Electric Light Association, on the Legal Aspects of Execution by Electricity, which promises to be extremely interesting.

**A Feasible Plan.**—The *Herald*, in a recent issue, suggests editorily a plan wherein electric railways can be made feeders for the suburb on steam lines. The plan as outlined is to have electric roads constructed to extend in several directions from each suburban steam railroad station and have a system of transfer or single fares for both so that large tracts of now unoccupied land can be made available for building purposes and thus relieve the overcrowded city tenements. It seems an entirely feasible plan and one that can and probably will be adopted in the neighborhood of Boston, which certainly bids fair to be the banner city in the matter of electric street railways.

**Electricity Afloat.**—A Boston man has an ingenious contrivance in the shape of an electric propellor for small boats. A "C. & C." motor furnishes power and the mechanical arrangement is such that the screw is shipped over the stern and fastened there when wanted, much as is a rudder ordinarily. Last week the boat made several trips around the bay, current being furnished by the G. A. Johnson storage batteries, a description of which has been given in these columns. Fourteen small cells succeeding in driving a 25 foot boat at a satisfactory speed for some 15 or 20 miles, and were afterward used for lighting their complement of incandescent lamps in the laboratory the next day without any recharging. This branch of electric power application will show some important advances in the next few years and Boston will not be behind in the procession.

**Mr. H. E. Duncan Returns.**—The many friends whom Mr. H. E. Duncan, Manager of the non-magnetic department of the Waltham Watch Company, has made in the electrical fraternity during the past few years are pleased to see him in the city again after an absence of several months in the South and West, where it is needless to say the already large business of the Waltham Company has received an additional impetus, particularly in the non-magnetic department. Mr. Duncan expects to remain in the city several days and will be on hand at Niagara Falls at the convention.

**Electric Cars for Recreation.**—How any visiting committee could inspect and travel over Boston's electric roads and not become strong converts to the system could not be easily explained and it may be added that they invariably are convinced of the merits of electric propulsion in very short order. The pleasure of a ride on the swift-running cars out into the suburbs is appreciated, and the number of such pleasure excursionists is increasing. As happening to be the most convenient, I took one of the Chestnut Hill cars one evening last week and made the round trip with it. It happened to be a Bentley-Knight car and made the trip without hitch or halt of any kind, except when brought to a standstill by the conductor's signal. But about one-third the full power capacity was used on the levels and the reserve made the car climb the grades at an apparently almost increased speed. The drivers complain that the running time is too slow, as they invariably have to kill time somewhere on a trip, while never exceeding a safe speed limit in the suburbs. The sensation of gliding smoothly along over a soft green lawn, the space between and on the sides of the rails being entirely grassed over, is decidedly a new one and has a charm of its own. The overhead wire construction is now complete to Park Square and the cars began running there last week. The drivers seem to have a preference for the Bentley-Knight speed-controlling lever. The handle and movement they say are more convenient than the rotating key. For an evening's excursion no pleasanter trip can be made than an electric car ride over any of the lines in the suburban districts. T. W. S.

Boston, Mass., July 15, 1889.

### OUR TORONTO LETTER.

**Incandescent Lighting** is commanding a good deal of attention in Canada at present, and quite a number of the present arc lighting companies are arranging to add an incandescent plant to their outfit.

**St. John, New Brunswick, Gas and Electric Company** are making a joint system pay them very nicely, as from current reports they have not only been able to pay an eight per cent dividend on the stock of both companies, but to add to their rest fund about $15,000.

**The Hibbard Electric Company,** of Montreal, intend to have a model electric establishment when they get into their new premises. The machinery on each floor will be run by a separate motor, power being transmitted from the motor at the engine.

**The Reliance Electric Company,** of Waterford, who manufacture arc lighting apparatus, are rapidly pushing to the front.

**Another Gas Company** has entered the field of electric lighting, and in its terrible effort to get in is cutting prices to where it is scarcely possible for any electric company to make money or pay even a six per cent. dividend, let alone provide anything for a sinking fund through which to perpetuate the permanent and primary condition of its plant. I refer to the Hamilton Gas Light Company, who are apparently likely to secure the lighting business of the City of Hamilton. If the tender of the gas company is accepted there probably will be lively times in electrical matters in Hamilton, as the present electric company is there to stay even if they don't make any money.

**The Port Hope Electric Light and Power Company** has given Mr. Cooper, the agent of the Fort Wayne Jenney Electric Light Company, an order for a 650 light plant of the Slattery induction system, after due consideration and investigation. By the way, speaking of Mr. Slattery reminds me that he paid his first visit to the Dominion this week.

**Mr. Slattery Spent Thursday** of last week at Ogdensburg under the paternal care of Mr. Findlay, manager of the combined gas and electric light company, whose electric light station is one of the model ones of the State. On Friday Mr. Campbell, of the Kingston Electric Light Company, showed Mr. Slattery that he could not only attend to electrical matters in a first-class manner, and by ocular demonstration show the advantage of the "Wood-Fuller" arc system, but also entertain his friends amid the beauties of the Thousand Islands in his own yacht. Saturday found Mr. Slattery looking over electrical matters in Toronto and in the afternoon he with a party of electrical friends, were invited to a cruise over the bay and around the island in his steam yacht, "The Electric," by the general manager of the Toronto Electric Light Company, Mr. J. J. Wright. Among those invited were L. A. Morrison, Esq., president of the Woodstock Electric Light, Power and Street Railway Company; Joseph Blakeley, Esq., secretary and treasurer; W. J Morrison, representative of the "Jenny" Company in Canada. SYNTAX.

### PERSONAL.

Mr. Maurice B. Flynn, of New York, died at Long Branch last week of cancer of the stomach. Mr. Flynn was a well-known resident of this city and of late had become largely interested in electrical enterprises.

Mr. E. T. Gilliland, Lieut. F. W. Toppan, U. S. N., and Mr. J. C. Tomlinson formed a party of well-known electrical gentlemen who sailed for the Paris Exposition on the French steamer "La Bretagne" last Saturday. They will be absent about two months.

Mr. C. J. H. Woodbury, of Boston, is visiting Europe in company with the American Engineering Societies, and was elected member of the Joint Executive Committee in charge of the European tour. The engineers are having a very enjoyable visit abroad, and are being handsomely entertained. It is said that Queen Victoria never before permitted visitors to go through her living rooms at Windsor castle, and the fact that this privilege was granted the engineers speaks volumes for the fine appearance and intellectual bearing of our American Scientists.

### Meeting of the Electric Exchange.

The regular quarterly meeting of the New England Electric Exchange was held at the rooms of the Boston Electric Club Thursday afternoon of last week. President P. H. Alexander was in the chair, and a large number of members and those interested in the exchange were present. In opening the meeting Mr. Alexander made an interesting address in which he reviewed the work of the committees having in charge the matter of incorporation, and particularly complimented Mr. W. S. Hill, the chairman of the committee of incorporation for his successful work. In the course of his remarks President Alexander said:

As you are well aware, the Boston Board of Underwriters, since the first day of May, refused to grant any insurance policies on property in which electric light plants are operated, unless the person operating the same has obtained a license from this Exchange.

The N. E. Insurance Exchange has asked your directors to name a date when they may insert a similar clause on policies issued on property throughout the New England States. The impossibility of procuring sufficient examining boards for the increased number of men who would have to be examined should this idea be carried out, has decided your directors not to name such a date as yet, and not until after consultation with you to-day. The Exchange itself has received a great deal of favorable comment not alone in this country, but in Europe, including a long article in the London *Electrician* a few weeks ago, recommending the adoption of of our methods throughout Great Britain.

I spoke to you at the last meeting of the action of the National Electric Light Association, in trying to secure for the members of the Association throughout the United States, the advantages now enjoyed by the New England Exchange and letters from the insurance bodies throughout the United States received by the committee of the National Electric Light Association promise hearty co-operation of the insurance men with our methods of licensing. I am proud to say that during a visit to the most promising cities in the United States, where I personally looked into the methods prevailing there on installations, that the work done in New England compares favorably with all, and I share in the general belief, that to your methods of examining, and licensing employees of electric companies who hold responsible positions, is due the superiority of the work in the New England States over that of any other section of the country, and I hope that you will continue to co-operate with your officers to bring about such results in the matter of installation of electrical apparatus, that electricity will be regarded everywhere, not only as the best mode of illumination and the best method of transmitting power, but also the safest, and least dangerous of all artificial means of distributing light and energy.

Mr. Henry B. Cram, whose work as secretary of the Exchange has had much to do with its success, read the minutes of the previous meeting with the secretary's and treasurer's report, which were accepted. The treasurer's report shows a satisfactory balance for the quarter. The formalities of transferring the business property, etc., of the unincorporated exchange, over to the incorporated body was then gone through with. The matter of extending licenses beyond the one year limit was then taken up as the best business of the first regular meeting of the incorporated New England Electric Exchange. After some discussion it was voted that licenses may be extended for one year at the discretion of the directors and with the approval of the insurance inspector, upon payment of the regular fee and without re-examination, Mr. Alex. P. Wright afterward moved that a committee be appointed to revise the present form of application and the chair appointed Messrs. Wright, Cram and Ridlon. After some open discussion it was voted to submit the following list of questions to applicants for licenses:

1. Present employment.
2. Duties of the employment.
3. Preparatory education for electrical work. (Concise statement of same.)
4. Date of first employment.
5. List of several positions held.
6. Concise statement of work and experience.
7. Furnish such references as you may obtain from persons by whom you have been employed.

After some further discussion of the question whether examiners should be paid for their services and on the advisability of a permanent examining board, the meeting adjourned.

## Telephonic News

⁂ We are informed that a telephone line has just been completed from Sheffield, Ala., to Bailey Springs.

⁂ At Griffin, Ga., there is now a telephone exchange of 46 subscribers under the management of P. H. McDowell, who is also manager of the Western Union Telegraph Co.

⁂ Mr. W. M. Yenawine has been appointed assistant superintendent of the Missouri & Kansas Telephone Company. The other officers of the company now are: J. R. Mulvane, president; W. W. Smith, secretary; N. R. Furguson, treasurer; T. W. McDaniel, superintendent.

⁂ The postmaster at Kansas City, Mo., has evidently been compelled to stand at his telephone and listen to growling. In a circular he says: "As long as humanity exists errors and faults will occur. It is much better to properly present them for correction than to swear at the post office or abuse somebody over the telephone."

⁂ The base-ball fever has invaded electrical circles. The employés of The E. S. Greeley & Co. administered a healthful base-ball whalloping to the employés of the Empire City Electric Company recently. The game took place at Prospect Park, Brooklyn, Saturday afternoon, July 6, and lasted two hours, leaving a score of 34 to 11 in favor of the Greeley people. There will no doubt be a return game played.

⁂ An old telephone pole that has been in use for several years and about rotted off at the ground, fell the other night at Atlanta, Ga., after being thoroughly soaked with water from a week's rain. Two policemen were on their way to the station house, and in the stillness of the night, without any warning sounds, the pole fell and struck one of the officers on the head and arm. He was insensible for some time and one arm was badly hurt. The pole had only one wire on it, and this perhaps broke the fall.

⁂ President Tyler, of the Southern New England Telephone Company, is looking for a permanent location in Hartford, and will purchase property, it is said, as soon as a desirable site can be obtained for that purpose. The change will be made with the view of undergrounding the wires for most of the service in the city. This season an important area of New Haven will be accommodated with underground wires. It is stated that the company will make arrangements for 3,600 underground wires at the outset in this city.

⁂ The many friends of Mr. W. T. Gentry, manager of the Atlanta, Ga., Telephone Exchange, who is well and favorably known in telephone and telegraph circles, will regret to learn that he has been in very bad health for the past three months, unable to attend to business. He is now at Cumberland Island and the latest news is favorable for his recovery. In the absence of Mr. Gentry, Mr. H. H. Jackson, the assistant manager, is running the business and keeps every thing running in a satisfactory manner.

⁂ Mr. Geo. A. Langworthy, manager of Sheffield, Tuscumbia and Florence, Ala., Exchanges, reports the three towns combined as having 165 telephone subscribers. There are about 10,000 residents in the towns. The future prospects for telephone business, as well as all other business in that section, is very good. Each town has electric lights, and in Sheffield a contract was recently closed for the building of a $100,000 hotel. When completed it will have electric bells and lights throughout and will add much to the already prosperous town which is situated on a bluff 100 feet high, beside the waters of the Tennessee River.

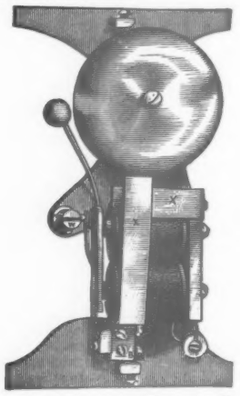
### For the Benefit of Telephone Subscribers.

To the Editor of Electrical Review:

I send you the following rules for the use of the telephone, which have been carefully worked out with a view to covering the situation:

If you have a telephone in your store, ring up central and then go and wait on a customer. Pay no attention to the bell when central rings back but go back to the telephone in about 15 minutes, ring up central and make a big "kick" because central did not wait for you.

Always speak crossly and swear at the central. She likes that.



Inside of Combination Bell for Return Call and Fire Alarm.—Partrick & Carter, Phila.

Mumble in an undertone and if central does not hear you tell her to "take the cotton out of her ears."

Put your lightning plug in before a storm and do not take it out again; but go around to the central office and threaten to lick the whole company if they don't answer when you ring up.

Take your time answering your bell, or what is better do not answer at all; but in half an hour ring up and ask who called you up, and make a big "kick" if central has forgotten who it was.

Always ask Central to transfer the message for you. She likes to do this, as she generally has nothing to do, and this helps to kill time for her.

2, 4, and 6 Call Indicating Bells, made in Ash and Walnut Boxes, with Names instead of Numbers, if desired.

Allow everybody who wants to, to use the telephone. Hang the receiver big end up, as in this way it gets full of dust, making another excuse for complaint.

Spit tobacco juice in the transmitter occasionally, as this improves the sound.

Refuse to pay toll messages, and if you are on a line with any one else, listen to everything said.

Whenever you see the manager, tell him if he cannot give you a better telephone, or get that one fixed, you will throw the whole thing out of the window. When the inspector comes around, deny point blank that you ever complained, and say that it works like a charm.

And lastly, kick at everything and cause as much trouble for the company as you

Style 2, House Annunciator, made from 4 to 20 Indications.

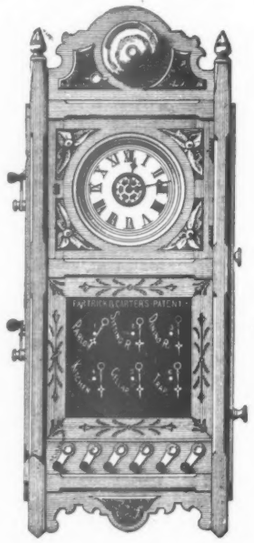
can. They are delighted to have you do this, for otherwise business would be monotonous for them.

N. B.—Paste these rules on the wall beside your telephone, and read them carefully once every day. Central.

Newburgh, N. Y., July 7. 1889.

⁂ Norman Williams, vice-president of the Chicago Telephone Company, was a New York visitor last week, en route to the Paris Exposition.

⁂ Since the removal of the injunction against the Chattanooga electric street railway, the company has been pushing their work and cars have been running very successfully over the entire line. Difficulty is experienced in keeping the people from hanging to and overloading the cars.



Clock Alarm, Furnished with any of the Regular Style Alarm Cases.—Partrick & Carter, Phila.

⁂ The full amount of stock to build the Lincolnton, Ga., and Washington line has been subscribed. The stockholders met one day last week and elected the following board of directors: M. M. Sims and T. B. Green, of Washington, Ga., P. J. Holliday, C. M. May and T. H. Rimson, of Lincolnton. The directors will meet on the 4th and elect a president, secretary and treasurer, and work on the line will commence at once.

### Improvements in Call-Bells and Annunciators.

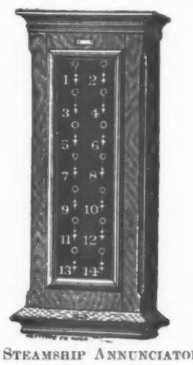
The long established house (established in 1867) of Partrick & Carter, Philadelphia, is again to the front with an interesting catalogue, illustrating and describing their electric annunciators and call-bells. This branch of electrical work is one of the liveliest and is full of active competitors. Yet this widely-known house has always kept in the first rank, and abreast of all improvements. We illustrate several specimens of recent work in this issue, the description appearing beneath each cut.

### Objection to the Telephone as a Missionary..

We are not at all sure that we read aright in reading in the columns of a London contemporary that "the telephone is being made to serve the cause of religion in the south of England," and in this wise. The South of

Style 2, Modified Burglar Alarm made from 4 to 18 Indications.

England Telephone Company, as we are informed (remarks the *Christain at Work*) has put telephone wires into one of the Congregational Churches in Tunbridge Wells, and on a recent Sunday sixteen were connected with the church. These included "doctors and apothecaries, clerks working in various parts of the town, an invalid lady who has been obtaining consolation from the telephone for several months, and some lazy club men who went to the thing presumably more from a spirit of experiment than devotion." Now, if the doctors can spare the time from their patients, why cannot they be present in bodily form in church? If the apothecaries are not compounding precriptions, why should they not be in their pews? —that is if they have any pews. If the



Car and Steamship Annunciator, made from 6 Indications up.

clerks are working in various parts of town how can they keep their precious minds on their work and on the Gospel too? As to the lazy club men, presumably their spirit of devotion is not very active—not nearly so active as their spirit of curiosity and their desire for entertainment, of which the Gospel it seems, has its entertaining side when presented through the medium of the positive and negative poles. The sole redeeming feature in the case is the invalid lady. Whether it is worth while to turn the telephone into a preacher for her, while serving as a medium for luxurious ease and novelty, and a promoter of church absenteeism, is a question which each reader may answer for himself. For one thing, we may seriously question if converts will crowd the churches by means of the missionary efforts of the telephone, or if that ingenious instrument will hasten by one second the dawn of the world's Millennium Day.

## Electrical Specialties.

The Electrical Supply Co., at Chicago, have been mainly instrumental in introducing Fletcher's electro-mechanical devices to the public, and while these specialties are simple, yet they are thoroughly practical, having been invented by Mr. Fletcher, whilst manager of one of the largest electric light plants in the country.

A brief sketch of these devices may be of interest to our readers.

Fletcher's insulating lamp hanger is used to insulate electric arc lamps from grounds when placed on boom or iron awnings in

No. 2—Fletcher's Porcelain Insulation Gem Wire Holder.

front of stores or when hung on to gas pipe or other direct "grounds" inside, but its most useful office is to prevent wear on the sash cord (or rope) to which lamps are hung at street intersections and to thoroughly protect them from grounds in wet weather; when this hanger is used the rope cannot become worn and therefore the lamp will not fall.

The sleet proof pulley, as its name indicates, is a protection against pulley sticking

No. 1.—Fletcher's Gem Wire Holder (Wood Insulation.)

in sleety weather, and it is mechanically so well made that lamps pull up much easier with it than with the ordinary pulley.

The "midget" pulley is the small size sleet-proof pulley used in raising and lowering incandescence lights at street intersections, or other light weights; it is intended to be used with a ¼-inch cord.

The "jumbo" sleet-proof pulley is precisely the same as the two above mentioned, except that it is to draw up extra heavy arc lamps and is large enough to take an inch rope, if desired.

The "twin" sleet-proof pulley is so

No. 4.—"Duplex" Wire Holder.

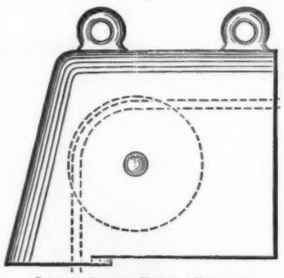
arranged that a weight may be hung on to equalize weight of lamp so that any boy can pull them up; this pulley is truly a labor-saver in every sense of the word, and where trimmers can have the use of this pulley, they can trim 50 per cent. more lamps than with the old plan.

Fletcher's Gem Wire Holders are entirely original in their design and there is nothing made which resembles them in any way.

Nos. 1 and 1½ are wood insulation designed to be used in factories and other dry places.

No. 2 is of the best porcelain insulation; is suitable where ornamental or plain wiring for arc circuits is required, inside buildings or store rooms; wiring done with this wire-holder does not in any way injure the insulation, nor is there any tie-wire, therefore the insulation is kept absolutely perfect.

No. 3. "Jumbo" Wire-Holder is an extra heavy iron frame and screw, with insulation of best opalescent glass. The opening is one inch in diameter, flanged at each end and is capable of being used as an insulator



Jumbo Sleet Proof Pulley.

to convey the largest cable or smallest wire, either in or out of doors; it is especially adapted for use in breweries, tunnels and other damp places.

No. 3½ "Tree Top" Wire-Holder is the same frame and insulation as No. 3, but instead of the screw a "boss" is cast as a part of frame, a hole drilled through it for the purpose of changing the same to the limb or body of a tree with a wire as may be required, and tree may sway back and forth

No. 3½.—Tree Top Wire Holder.

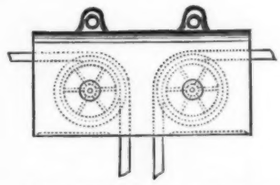
without the least injury to insulation or danger of breaking the live wire.

Nos. 4, 5 and 6 are mounted with wood cleats, No. 4 for either small arc or medium size incandescent wires; Nos. 5 and 6 are for building branches on the ceiling. The benefit derived from the use of these wire-cleats is to protect the wall from being marked with flies or electric current and to hold the wire taut for all time. The wire is by this means suspended one inch below the ceiling, only the outer edge of the boss leaving its mark when wire is taken down.

The Dayton Lifts Tackle is said to be the only device yet invented which will cut an arc lamp out of circuit at the cable and lower the same to the ground without danger to the trimmer. It is especially valuable to electric street railway companies when arc lamps are to be lowered between their wires, as there is no loop (or current) wires to lamp where the Dayton Lifts Tackle is used.

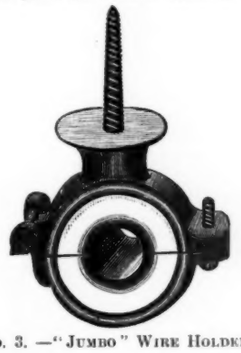
## A Real Electric Plant.

M. Fulbert-Dumonton, in the course of a curious and interesting article on electricity in the animal and vegetable world, says: "The vegetable world possesses also its electrical species. Has there not been discovered in the forests of India a strange plant which possesses to a very high degree astonishing magnetic powers? It has been badly named *Philotacea electrica*. The hand which breaks a leaf from this plant receives immediately a shock equal to that which is produced by the conductor of an induction coil. At a distance of six metres a magnetic needle is affected by it, and it will be



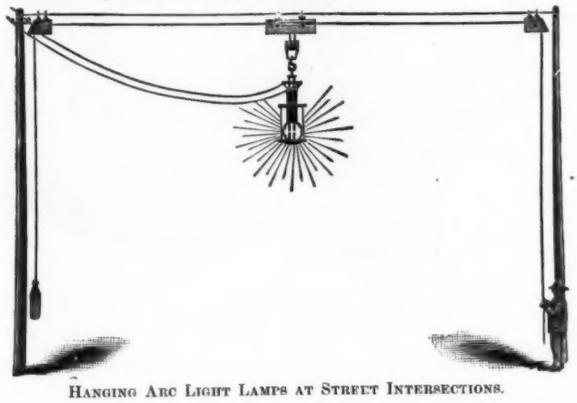
Twin Sleet Proof Pulley.

quite deranged if brought near. The energy of this singular influence varies with the hour of the day. All-powerful about two o'clock in the afternoon, it is absolutely annulled during the night. At times of storm its intensity augments to striking proportions. During rain the plant seems to succumb, and bends its head during a thunder shower; it remains there without force or virtue even if one should shelter it with an umbrella. No shock is felt at that time in breaking the leaves, and the needle is unaffected beside it. One never by any chance sees a bird or insect alight on the electric plant; an instinct seems to warn



No. 3. —"Jumbo" Wire Holder.

them that they would find there sudden death. It is also important to remark that where it grows none of the magnetic metals are found; neither iron, nor cobalt, nor nickel, an undeniable proof that the electric force belongs exclusively to the plant. Light and heat, phosphorescence, magnetism, electricity, how many mysteries and botanical problems does this wonderful Indian plant conceal within its leaf and flower?"



Hanging Arc Light Lamps at Street Intersections.

.... In the annual meeting of the American Union Telegraph Company, of New Jersey, held at No. 14 Exchange Place, recently, the following officers were elected: President, Thomas T. Eckert; vice-president, Charles A. Tinker; secretary and treasurer, Thomas F. Clarke; directors, Thomas T. Eckert, Charles A. Tinker, A. R. Brewer, Thomas F. Clarke and J. B Bertholf.

## TELEGRAPHIC

.... It is announced that fifteen telegraph offices are now in operation at the Thousand Islands.

.... The self-winding Synchronized clocks have been introduced to supersede the commercial time ball in keeping the people of Buffalo posted as to the correct time of day. They are wound every sixty minutes by an automatic electric arrangement on the top of each clock, but the motive power is not derived from electricity, but from the action of a fine spring, as in the ordinary mechanical clock. All clocks belonging to this

No. 5—Incandescent Wire Holder. (Two Wires, Wood Insulation).

system, which is controlled by the Western Union Telegraph Co., are connected by wire with and regulated from the United States Naval Observatory at Washington. Thus uniform time is secured throughout the entire system.

### A New Rule for Sending Telegrams Through the Telephone.

A new rule in relation to telephoning to a telegraph office has just been put in operation by the Southern New England Telephone Company. The rule is to this effect:

No. 6.—Incandescent Wire Holder. (Three Wire, Wood Insulation).

Some time since the Bell Telephone Company made a contract with the Western Union Telegraph Company whereby the former should place an instrument in the various offices of the latter, to be used exclusively for sending a message to the office of the telegraph company, said message to to be sent away. The terms of the contract were to the effect that the telephone company should receive a certain percentage for every message sent to the telegraph office through the telephone. Not only have the telephones been used for this purpose, but for everything else. In consequence of this,

Insulating Lamp Hanger.

the telephone company have notified the telegraph company that hereafter 10 cents will be charged for every message going through the telephone. The rule will be strictly enforced. Managers in the various telegraph offices have refused to answer the calls on their telephone for fear that some one will say something other than what ought to be said. The difficulty is now being considered by the two companies, and the matter, it is thought, will be amicably settled.

* * The electric cars to run between Albany, W. Troy and Troy will have two tracks.

* * The electric road recently constructed at Asheville, N. C., at a cost of $50,000, is meeting with great success.

* * The cars of the new electric road at Boston are now making their complete trips. The overhead system is mostly used.

* * The Citizens' Street Railroad Company have been granted a franchise to construct an electric line in that city to Breghtwood, from the northeast terminal of Massachusetts avenue, Washington, D. C.

* * Work has been begun upon the new Beverly and Danvers railroad. The road will be three miles long and it is hoped to have it completed by August 1st. It will be operated by the storage battery system of the Electrical Co.

* * The Southington, Ct., board of trade has been making an effort to get a concern which manufactures a new electric motor, to locate there, which the company has agreed to do, in event of $12,000 additional capital being raised for it.

* * The arrangements for operating the Edison magnetic ore separator near Bechtetsville, comprise a 150 horse-power engine, a Brennan crusher, three pairs of corrugated rolls and necessary conveyors, pockets, belts, two 80 horse-power boilers, etc.

* * When completed, the Broadway line, at Albany, N. Y., will be the longest electric railroad in this country, with its branches being 16 miles. That of the greatest length now being operated is 14 miles, in Topeka. The power is to be furnished by dynamos driven by three 90 horse-power engines. The 15 new cars ordered will weigh over four tons each.

* * The new electric road at Salt Lake City will be ready for operation this week. In reference to the new road we quote from the Salt Lake *Herald:* "The inauguration of the electric railway system in Salt Lake is another big step forward in the march of progress, and will be hailed with delight by all interested in the prosperity of the 'Gem of the Rockies.'"

* * The Electro-Automatic Transit Company, of Baltimore, after about a year of carefully conducted and conclusive experiment, has patented its multiplicity of electrical and mechanical appliances in the United States and all over the world, as a preliminary to putting the system regularly to work wherever required. By this electro-automatic arrangement the morning papers may be delivered for the breakfast table, and the evening papers before supper time at distant points. It will deliver letters almost with the promptitude of the telegraph sending a message. The mails between New York and Omaha will be carried in a night. It will handle perishable light freight from long distances, will deliver with celerity the mails and parcels in cities and suburban towns, and will multiply many times the business of the post office and express companies. Its advantages are not alone in its speed, but in the economy and frequency with which trains can be dispatched. In addition to all these things it will save interest on remittances at long distances, will bring the people closer together, and will create new enterprises. Doubtless, as in the case of telegraph, its important uses cannot be anticipated in advance of its going into active operation. Its development will create new fields of usefulness not now thought of. Such, in brief, are what the persons interested in this investmeut claim for it.

## Improved Electric Railway Motor.

We publish in this issue views of the Sprague improved electric motor for street railway work. In its manufacture the details of mechanical and electrical construction is carefully attended to, and the most recent improvements have been adopted to meet the necessities of street car service.

Only one intermediate shaft is used between the armature pinion and the main gear, and the entire reduction is about 12 to one. All the gears and every part of the motor is made extremely strong and durable.

After each of these baths the armature was placed in position in the motor, and the machine was worked to one-third above its normal load, as measured by a dynamometer, for several hours without developing any trouble whatever. These tests proved that these machines can be relied upon under all conditions of weather.

Another improvement which has been adopted in this machine, is, that the field magnet coils are completely incased in covers as shown in the engravings which fully protect the wire from all outside damage;

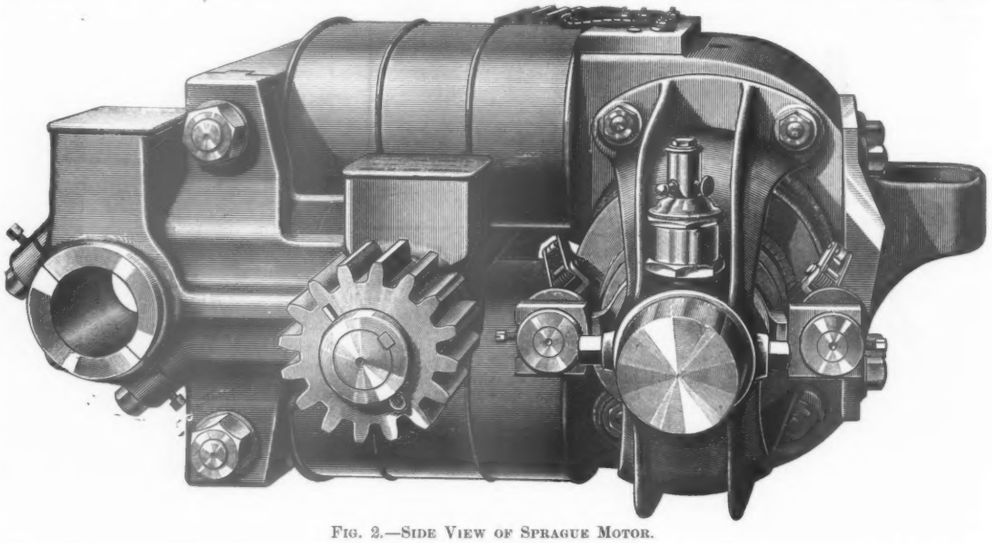


Fig. 2.—Side View of Sprague Motor.

The main gears are of the split gear pattern, so that in case of necessity they can be easily removed from the shaft without dismounting the machine. The pinion and all the bearings are also constructed so that they can be easily removed if necessary.

Attention has been paid in this motor to obtain a machine which will require a minimum amount of attention and care and other unfavorable conditions which motors for street railway work very often meet in actual practice. For this reason all the bearings are made dust-proof.

these casings are hermetrically closed, so that it is impossible for any moisture to affect the coils in any way.

The style of brushes used upon these motors is of a new design, which has been shown to give such excellent results in this kind of work.

Attention has been paid in the design of this motor, while care has been taken in regard to durability and strength, to reducing the weight to a minimum. For this purpose, and with this object in view, cast iron has been dispensed with, in the cores

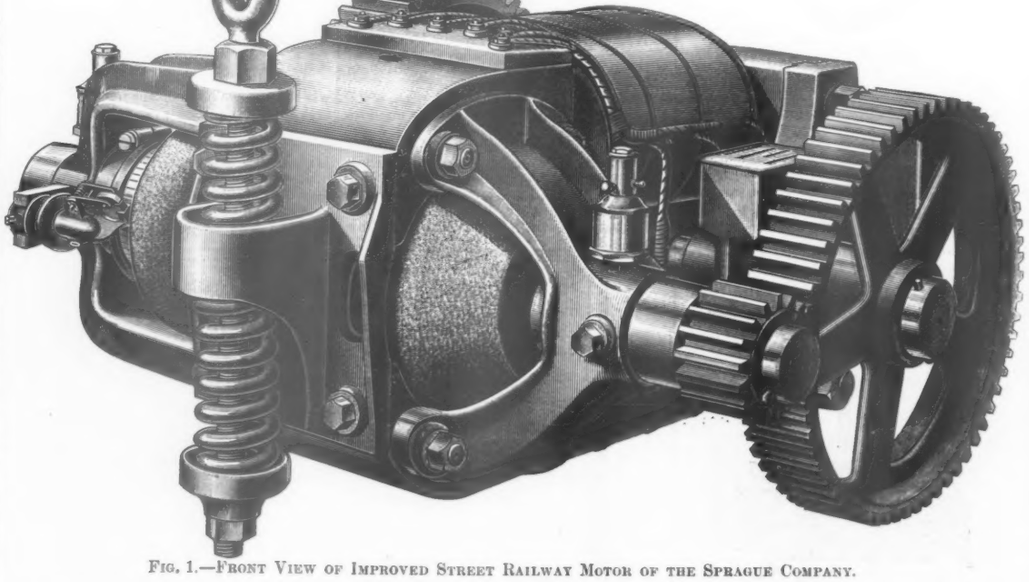


Fig. 1.—Front View of Improved Street Railway Motor of the Sprague Company.

The armatures are of the same type and have been proved to be water-proof and incapable of injury by moisture. In a recent test upon one of these armatures, made at the Sprague factory at Schenectady and described in this paper a short time ago, one of these armatures was placed successfully in a tub of fresh water and allowed to remain there for 24 hours, and in a tub of salt water and allowed to remain there for the same time.

and yoke of the field magnets, and wrought iron substituted.

These motors are already in operation at Wichita, Kansas; Marlboro, Mass.; Cleveland, Ohio; Cincinnati, Ohio; Erie, Pa.; Atlantic City, N. J., and one or two other places where they have been installed. They have been shown to give very good results and in the future this type of motor will be used in all of the Sprague Electric Railway installations.

## Shall Electricity Execute Our Criminals?

In the reference case of Kemmler, who was sentenced to be killed by electricity, a good deal of interesting testimony has been taken. The first witness examined before Referee Becker was Harold P. Brown, who had sold the State the dynamos and other apparatus to be used in killing, or attempting to kill, criminals sentenced to death. The meeting was held in Hon. Bourke Cockran's office, who appeared for the prisoner and against this method of execution. Mr. Brown testified as to the experiments he had made in killing animals, but acknowledged that he had never seen a man killed and had never known of the physical condition of any men killed by contact with electric light wires. He nevertheless was confident, from his knowledge of the subject, that the current would inevitably kill.

Mr. Brown said it was impossible to exactly determine the electrical energy required, as the moment the current is applied the resistance of the subject drops and the electro-motive force, which is one of the factors of the electrical energy, cannot be accurately fixed.

"Is there any difficulty in making a close contact with an electrode to the human body?" asked Mr. Cockran.

"If the electrode is properly moistened, and the supply of fluid is abundant, there is no danger of burning, for the fluid used in moistening cannot heat above boiling point."

"What is the intensity of the force required to kill a man of the average resistance when the charge is applied to his head?"

"Beyond any doubt the pressure of 1,000 to 2,000 volts, with the electrodes of the proper sizes, would be fatal with the current passing from head to foot."

Even with a man with a resistance of 50,000 ohms, Mr. Brown would not vary his opinion if the surface of the electrodes was

kept wet. Death would ensue, he calculated, in less than 15 seconds, and in this time the electrodes would not become appreciably heated. He doubted whether salt water, if used to moisten the electrode, could ever reach the boiling point on account of the rapid radiation of the heat.

Mr. Franklin L. Pope, the well-known electrical engineer, testified. Mr. Cockran then put a series of questions with the object of showing that according to Mr. Pope and other experts there does not now exist and probably there won't be devised any means of measuring accurately the resistance of the human body to electricity, that the death of a man by electricity depends upon several contributing causes, and that the machine to be put up in Auburn prison won't be capable of doing what Mr. Brown claims for it.

Mr. Cockran began by inquiring if a Wheatstone bridge could register the resistance of a living organism. Mr. Pope said he thought it was not fully capable of doing that, though it could measure the resistance of metals with almost absolute accuracy. He made the test at the Western Union office with the assistance of J. W. Gardiner, a Western Union electrician. He took hold of two electrodes, having previously wet his hands with sulphate of zinc. The current was turned on, and the resistance of his body through the chest and arms was measured. The measurements were taken with different electro-motive forces. One volt gave 6,300 ohms resistance; 10 volts gave 5,140 ohms, 50 volts, 3,850 ohms, and 100 volts gave 3,500 ohms, showing that the apparent resistance as determined by the Wheatstone bridge varied according to the currents.

Q.—Suppose you had been wire, would it have made any difference? A.—It would have given the same result with 100 volts as with one volt.

Q.—Can you account for the failure of the Wheatstone bridge to record when a living organism is used, and different voltages are used? A.—I conjecture that it is due to the chemical actions upon the fluids of the body.

Q.—Is there any means to measure accurately the resistance of a living organism? A.—I think there are no means to determine it as we can with an inorganic substance. If we were to send a man to be measured by half a dozen electricians the result would all vary. The man would measure differently, too, according to his physical condition.

Q.—Can electrical science measure the resistance of a living organism? A.—Well, you would get a result each time, but you can't tell whether it would be accurate.

Mr. Pope said he was familliar with the Westinghouse dynamo that Mr. Brown had selected for the execution of Kemmler, and that its maximum energy was 1,050 volts. Then Mr. Cockran read from Mr. Brown's book a statement that a dynamo capable of generating an electro-motive force of 3,000 volts should be employed and a current used with a potential of 1,500 volts for the execution of a criminal.

Q.—Would the instrument furnished by Mr. Brown be capable of supplying the electro-motive force equal to what I have read? A.—Understanding the machine to be a Westinghouse dynamo, I think it would not.

Q.—It is described, I believe, as a 600-lamp machine. A.—The number of lamps does not make any difference. The machines as sold for electric lighting do not have a higher voltage than 1,050.

Q.—If a person received a charge of lightning in his body, what proportion of that could be generated by artificial means? A.—There is little comparison between the two. Lightning would shatter a tree, but artificial means could not shatter a broomstick.

Q.—You could not knock down Trinity steeple with artificial means in electricity? A.—No, sir.

Q.—Has anything been constructed that could not be shattered by a stroke of lightning? A.—No. Lightning, I think, could destroy anything.

Q.—Can you tell what the effects of electric light currents are on a human body when shocks are not fatal? A.—The persons have generally been knocked senseless and their skin burned.

The wet pad of waste placed between the electrode of the death machine and the subject's body, Mr. Pope said, would not prevent burning of the flesh. "It would lessen the burning," declared Mr. Pope, "but would not prevent it wholly."

Q.—How long before the water in the pad will be heated to a boiling point? A.—A few seconds.

Q.—Might there not be conditions when the water would be turned into scalding water? A.—Yes and there would be times when the flesh would be; burned to the bone.

District Attorney Quinby objected to some of Mr. Cockran's questions, saying that Mr. Pope had no knowledge of the subject involved. Mr. Cockran replied: "Sir, this is a conscientious witness."

"He is the representative of the Westinghouse people," Mr. Quinby retorted.

"That does not disqualify him," exclaimed Mr. Cockran. "He is not a charlatan," giving a half side glare toward Mr. Brown, who sat a few chairs away to one side.

Then Mr. Quinby cross-examined Mr. Pope.

Q.—The Westinghouse people make a machine for lighting purposes, don't they, and they use what is known as the alternating current? A.—Yes, sir.

Q.—They object to the use of their machines for the execution of criminals? A.—Yes, sir.

Q.—Why? A.—Because I suppose the public might think such a machine would be dangerous in commercial use.

Q.—Do you know whether death by electricity is painful or not? A.—I believe it is very painful.

Mr. Quinby asked if the velocity of electricity was greater than the velocity of nerve sensation in the human body. Mr. Pope said he thought it was, and when Mr. Quinby, asked, "If the electrical velocity is greater than the velocity of nerve sensation, then would not death by electricity be painless?" Mr. Pope said he supposed it would.

By Mr. Cockran—Is it recorded anywhere in science what voltage would be required to kill a human being? A.—No. All I know is from what has been furnished by Mr. Brown. Wires for lighting are always charged to a certain extent. Sometimes the current, when the person comes in contact with it, kills and sometimes it does not.

Q.—Then there are contributing causes? A.—Yes, sir.

Q.—Have you ever inquired into the relative susceptibility of animals? A.—Usually when lightning strikes a crowd of men only one or two persons are killed. When it strikes a flock of sheep in a field there are more deaths. I don't know how it is in regard to cattle and other animals.

Q.—Is it not a fact that lightning is less fatal to man than to the inferior animals? A.—Yes, sir.

Q.—How much can you tell about the probability of killing human beings from experiments made in killing inferior animals? A.—I think very little.

Mr. Post—Do you say that the dynamo for the State to be used at Auburn prison can't be run with a voltage of 2,000 volts with safety? A.—Yes, sir, I say so. If you are going to run it at 2,000 volts you would have to run it at twice the speed it was built for, and this would be unsafe.

Mr. Cockran wound up his catechism of the witness with the interrogatory: "Could you, as an expert, describe a current which in every case and with every person would absolutely cause death?"

Mr. Pope answered: "No, I could not.

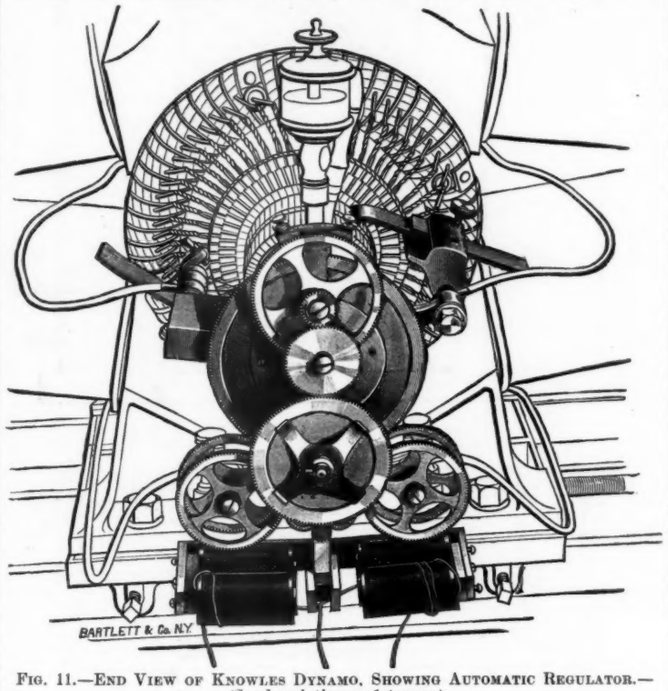



FIG. 11.—END VIEW OF KNOWLES DYNAMO, SHOWING AUTOMATIC REGULATOR.—(See description on 1st page.)

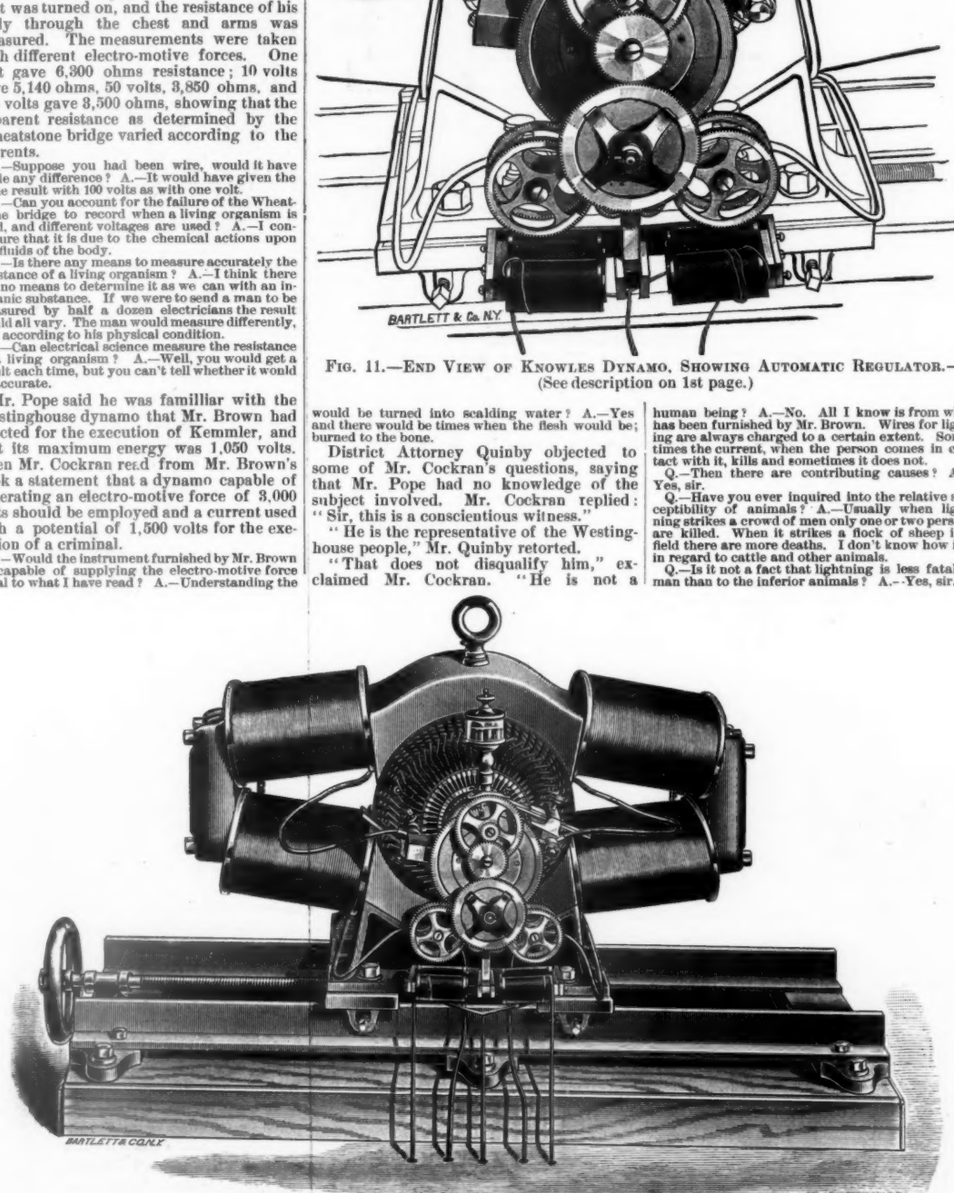



FIG. 10.—SIDE VIEW OF KNOWLE'S DYNAMO—MUTUAL ELECTRIC MFG. CO.—(See first page article).

## ELECTRIC LIGHT NEWS

—— It is stated that there are now in use at Asbury Park, 150 arc lamps of 2,000 candle-power each.

—— The construction of the plant at Sorrento, Me., is now finished, and 20 lights are already in operation.

—— The new Mississippi River steamer, "Kate Adams," will be illuminated by the Westinghouse system.

—— Notre Dame Church, at Montreal, will be lit by the Thomson-Houston system with 15 arc and 400 incandescent lights.

—— The Easton Electric Company, of that city, has bought the Belfast Gas Company for $17,500, the transfer to be made July 30th.

—— Work by the electric light company at Narragansett Pier, R. I., is progressing rapidly. Many of the hotels have already been furnished with lights.

—— At a special meeting of the city fathers of Rockland, Me., recently, an order was passed providing for 30 and not exceeding 40 arc lights, to run all night.

—— F. M. Wheeler, of the Schuyler Electric Company, Middleton, Conn., is now in Elmira, N. Y., where he is to put in a new plant of the Schuyler system.

—— The Congaree Gas and Electric Co., of Charleston, S. C., have decided to put in an incandescent plant to meet the large demand for private lighting in that city.

—— It is stated that Charleston has contracted with the Thomson-Houston company for an electric light plant at $3,600 per annum for ten years, the plant to furnish 40 lights.

—— An appropriation of $15,000 has been made for the introduction of an electric light plant at the Brooklyn Navy Yard, to supplant the present illumination made by gas which is very inadequate.

—— There is some talk of an electric light syndicate, which is composed of German and American capitalists, with a capital stock of $20,000,000, locating a plant in Milwaukee for the manufacture of machinery.

—— The plant of the Annapolis, Md. Electric Light Company is now in operation. The officers of the company are Joseph B. Seth, president; Dr. Geo. Wells, vice president and local manager; Harry E. Mann, treasurer; Elihu S. Riley, secretary.

—— The Mather Electric Company, of Manchester, Conn., have recently received orders for plants from the Progress Club, New York, 1,350 lights; Howland's Mills, New Bedford, Mass., 650; Evelyn Flats, New York, 500; Soldiers' Home, Michigan, 500; Duluth Imperial Mill Company, 200.

—— The Gardner Electric Company, of Gardner, Me., composed of some of the most enterprising citizens at the above named place, have commenced business starting with 50 arc lights and 500 incandescent, one 75 horse-power engine and one 80 horse-power boiler furnished the power, and it was thought they would be sufficient for the needs of the company for some time to come. But, since that time another 80 horse-power steel boiler has been added; also a duplex Dean pump and two injectors and a 125 horse-power compound condensing engine. A current is now being supplied for 60 arc and 1,200 incandescent lights, with a capacity for 100 arc lights of 1,200 candle-power and 3,000 incandescent. The company have strung over 50 miles of wires and their poles cover a distance of 17 miles. It is the opinion of men who have traveled much and visited many electric light stations, that Gardner has one of the best and most complete in all appointments, to be found in New England.

## KINDRED INTERESTS

**The Empire City Electric Company** has just issued a Spanish edition of its very handsome catalogue. The Spanish speaking countries are taking quite an interest in electrical matters, and the trade of this company in this new field has been constantly extending so much so that it was found necessary to print a large Spanish edition of the catalogue.

**The Okonite Company.**—While in Europe, the treasurer of the Okonite Company, W. L. Candee, closed a contract with Paris parties for 8,000 feet of telephone and telegraph wire. He examined many important locations in England, with a view of establishing a manufactory there, to supply the steadily increasing European demand for okonite wires and cables.

**The Straight Line Engine Company.**—The annual meeting of this company was held in Syracuse, N. Y., July 1st. Prof. John E. Sweet was elected president, H. M. Williams, of New York City, secretary, and A. A. Sweet, treasurer. It was decided to enlarge the factory at Syracuse at once, the increasing demand for the Straight Line compelling this. This engine is very popular in the electric field.

**Empire China Works.**—The works of this company in Greenpoint have been quite largely engaged of recent years in the manufacture of hard porcelain electrical supplies, and are widely and popularly known in electrical circles. A new price list, illustrated, has just been issued by the Empire Company, which will be sent to all who send a request to the company's address, 144 to 156 Green street, Greenpoint, Brooklyn, E. D., New York.

**The Mutual Electric Manufacturing Company.**—This company has just issued a very attractive catalogue, from the artistic hands of Messrs. E. E. Bartlett & Co., which is worthy of a special place in commercial electrical literature. The cover is embossed with the name of the company and with an illustration of the Knowles storage battery. The latter invention is attracting much attention in secondary battery circles, and is already in quite extensive use in Brooklyn. The company's offices are at 195 Montague street, with a New York office at 20 Nassau street, and a large factory at 286 to 296 Graham street, Brooklyn.

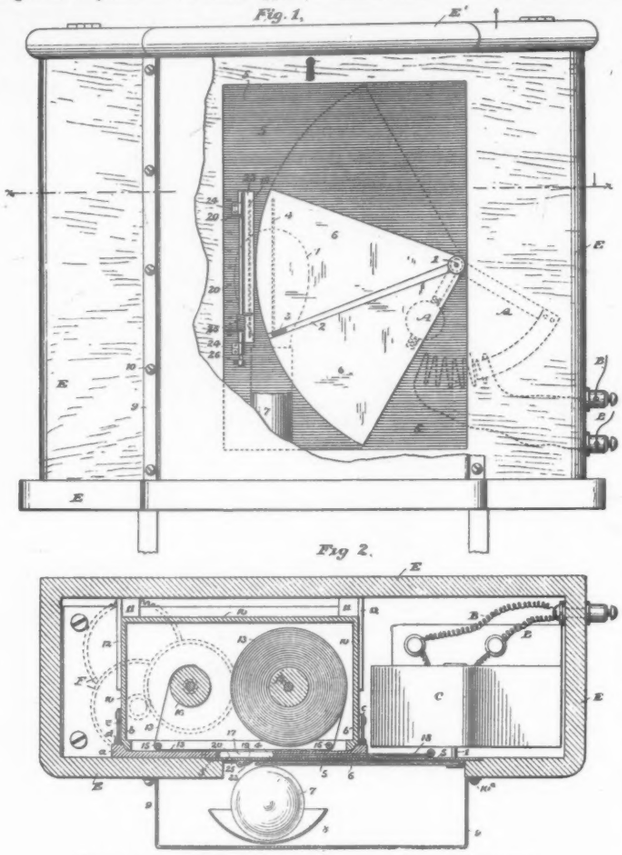
**J. H. Bunnell & Co.**—These widely known electrical people have removed their manufactory from 24-27 West street, which location they had occupied since the destructive fire at their works, March 5, 1888, to the fine new building, 136 and 138 West Twenty-fourth street, near the Sixth avenue elevated railroad station. The three upper floors of this building, 100x50, are completely filled up with excellent tools, and Messrs. Bunnell & Co. are once more well satisfied with their factory, and particularly with its location, which is in the heart of the city, in a pleasant business street, where its accessibility will be appreciated by many electrical patrons having lines of experimental work going on.

**James W. Queen & Co.,** of Philadelphia, manufacturers of electrical test instruments, have recently furnished goods amounting to $4,000 to Princeton College for the equipment of their course in electrical engineering, to be inaugurated in September next. The list embraces several large Wheatstone bridge sets as devised by Prof. Wm. A. Anthony. These sets, as well as several of the next size smaller, also ordered by Princeton College, are all guaranteed to be accurate within $\frac{1}{10}$ of one per cent. There is also a large $375 reflecting galvanometer, made for the special purpose of measuring high insulation resistance, the galvanometer itself having a resistance of 500,000 ohms. For measuring induction, co-efficients, etc., there is provided one of Ayrton & Perry's secohmeters. For the determination of magnetic constants there is a large Weber earth inductor which will be used in addition to the Kew magnetometer already possessed by the physical department.

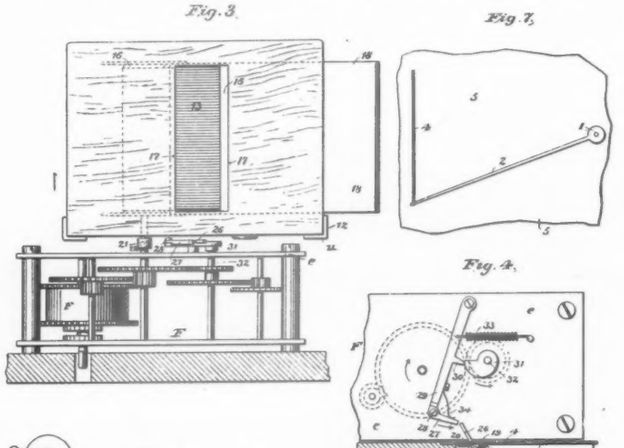
### Recording Apparatus for Electric Meters.

Mr. Geo. Walker, of New York, has just been granted a patent on the above apparatus. It was designed more particularly for recording the different quantities of current used in a given time in an electric-light circuit. The illustrations show the invention in connection with an ammeter and a system of electric lighting, although a voltmeter or other electric measuring-instrument may be used as well.

The primary feature or basis of the invention rests in the procuration of a photographic impression or copy of the fluctuations or variations of the movable or indicating part of the measuring-instrument.



FIGS. 1 AND 2.—THE WALKER ELECTRIC METER RECORDER.



FIGS. 3 TO 7, INCLUSIVE, OF THE WALKER METER.

In the carrying out of his improvements he employs an electric meter, an electric lamp or other source of light, a strip of sheet of paper or other substance or material sensitive to light, and clock-work or other motive power for feeding or advancing the sensitized substance. The needle, vibratory arm or indicating portion of the meter, moves over a slot or opening formed in a plate or partition located between the lamp or source of light and the moving sensitized substance, and causes to be made upon the latter a photographic impression or line. The dividing plate is also formed with a second slot, for which is provided a shutter that is operated at predetermined times to admit light for the purpose of making transverse lines or divisions upon the sensitized material, and said dividing-plate is furthermore formed or provided with a series of apertures or perforations for the constant admission of light upon the traveling sensitized surface for the purpose of producing thereon a series of longitudinal lines or divisions. The sensitized substance is arranged within a case or box, and by the clock movement is adapted to travel from one roller or spool to another. This box is removably fitted to the clock movement, is arranged within a frame or covering to the whole instrument or apparatus, and is provided with a slide or lid for excluding light from the sensitized material when the box is detached from the clock movement and removed from the apparatus for the purpose of developing the photographic impressions.

In the accompanying drawings, Fig. 1 is a front elevation of an apparatus embodying the invention, a portion of the outside casing being broken away to afford a view of some of the interior working parts. Fig. 2 is a horizontal section taken at the line $x\,x$ of Fig. 1. Fig. 3 is a front elevation of the clock-work and the box containing the sensitized material detached. Fig. 4 is a horizontal section to show the means employed for periodically actuating the shutter, the box of sensitized paper being removed. Fig. 5 is a diagrammatical view illustrating part of my invention. Fig. 6 is a fragmentary view of the sensitized material after development and bearing a record of the changes in the meter. Fig. 7 is a view of a modification of the invention.

### Looking Towards Amalgamation.

The Westinghouse Electric and Manufacturing Company, on Thursday of last week, by the advice of President George Westinghouse, Jr., it is stated, made an important move. The stockholders of the company voted to accept the charter of the Westinghouse Electric and Manufacturing Company, which was, previous to June 13, known as the Chartiers Improvement Company, of which Mr. Westinghouse had secured control. The charter was granted by legislative enactment in 1871, and conferred upon the Chartiers Company extraordinary powers and privileges, such as have been impossible to secure under instruments of the same class granted by the State since the new constitution of Pennsylvania went into effect in 1874. The charter is said to be of the old-fashioned blanket order, empowering those operating under it to do any sort of business or manufacturing with the exception of running a bank or issuing bank notes. This removes the last obstacle, it is stated, in the way of a general consolidation of all the Westinghouse electric interests in the United States. The work of exchanging certificates of stock in the Westinghouse Electric and Manufacturing Company for those of the original Westinghouse Electric Company will begin as soon as the new certificates can be prepared by the engraver and printer.

**The Thomson-Houston Co.** has received its bids for the erection of the proposed new factory building, at Lynn, Mass. It is to be devoted to the brass foundry and brass finishing, and will be of large dimensions, with chimney 60 feet high.

**The Florence Electric Light and Power Co.,** Florence, Ala., has signed a contract with the Southern District Telephone, Telegraph and Electric Company, headquarters at Birmingham, for three new dynamos and engines and boilers complete. They will also erect a two-story brick building, 40 by 80. The additional plant will cost $26,000.

## The New Williams Vertical Steam Engine.

This new engine is built by the Williams Engine Works, 447 North Street, Baltimore, and the engravings present views of the engine and an indicator diagram. The engine is intended for high speed (850 revolutions per minute), and has a number of special features. The piston is a hollow casting shrunk on the rod, with plain spring ring. The valve, it is claimed, is perfectly balanced, and is a flat plate, working between two flat parallel surfaces, one of which is an adjustable plate which sets in inclined ways in the bonnet. This plate has a relief plate in the back of it, steam passes in through the central part and to the inside of the valve and pressure plate, the pressure tending to press the plate down to the valve, a set screw in the side of the chest sets against the pressure plate and keeps it in position. As the valve wears, it will become leaky; the plate provides a ready means of taking up this wear, a jamb nut on the set screw is loosed, and the set screw

FIG. 1.—VIEW OF THE WILLIAMS VERTICAL STEAM ENGINE, BALTIMORE, MD.

adjusted away from the chest; the plate follows down the inclined way and comes in contact with the valve. The adjustment is best done while the engine is running, as the adjustment can then be *felt*. The screw can be taken away entirely without affecting the valve in the slightest; the plate will lift and relieve the cylinder should there be an accumulation of water in it.

There are but three pieces in the governor, two weights and one eccentric. The weights are hung on large steel pins, set in two of the arms of the wheel, one weight is ahead of the fulcrum, the other behind it. The eccentric has two arms cast on it, in the end of each arm a large steel pin is secured which fits in accurately reamed holes in each weight; as the weights travel outward the eccentric is carried across the shaft in a perfectly straight line, so varying its travel; the lead remains constant at all times. It is impossible to make it jump or race and its extreme variation is said to be less than two per cent.

A very important feature of this governor is that it can be oiled while running; it has but four bearings, two in each weight, an oil hole runs from each of these bearings to a common point, a tube is inserted at this point which extends out and has a lip on the end, a bracket extends from the side of the frame and supports an oil cup with a wick on it, as the engine revolves the tubes pass the wick and take up a small quantity of oil which passes to the bearings.

The engine is thoroughly well built in every particular and well balanced. Every engine is tested under steam, friction brake and indicators applied, and put under actual conditions of work and known to be right before being passed.

The indicator-cards shown were taken from a 5x6 engine running a 50 light dynamo at W. P. Hawey & Co.'s packing house in Baltimore. A single indicator was used and placed on the waste pipe, as that engine was not made for attaching indicators. The steam and exhaust pipes are both 75 feet long, this causes considerable back pressure on the exhaust. Engine was running about 40 lights at the time; boiler pressure, 80 lbs.; number of revolutions 348, 40 spring.

Oscar and Alphonso Peeper, two San Jose, Cal., boys, 17 and 19 years of age, have made a 25-light incandescent plant that is now used in lighting the agricultural works at San Jose.

The Commercial Union Telegraph Company, who are extending their lines throughout the South, have reported the opening of offices at Richmond, Alexandria and Fredericksburg.

The two divisions of the Great North western Telegraph Company, in the State of New York, heretofore known as the Plattsburgh and Watertown divisions, have been combined under the name of the New York division, Warren Dow, of the Plattsburgh division having resigned. A. R. Porte, of Ogdensburg, who has been superintendent of the Watertown division for the past four years, has been appointed superintendent of the combined divisions, which covers all New York State north of Oswego on one side, and Whitehall on the other. Mr. Porte is the youngest superintendent in the telegraph service having control of such an extent of country. His headquarters will continue to be at Ogdensburg, where the supply department for both divisions will also be located.

A traveling electric light has been used in Germany with much success. The arrangement is a very simple one. A dynamo, with an engine to drive it, is mounted on a wagon, something like that of a steam fire engine, containing boiler, fuel box and water tank, complete for a night's service. A supply of wire and a number of poles corresponding to the number of arc lights required, are added to the equipment, which is then drawn by a pair of horses to any desired place. On arriving there the poles are set up where required and stayed with wires fastened with stakes driven into the ground; the lamps are then hung to them and properly connected, and the engine is then set in motion. The lights immediately kindle, and from one to 50 lamps can be operated, according to the power of the machine. As the lamps can be suspended anywhere, and are not affected by wind or rain, the advantage of the apparatus to contractors and others who have to carry on night work is apparent.

## An Improvement in Rail Construction.

Sometime since we illustrated a new form of street railway rail and chair for its support, the inventions of Mr. R. T. White, of 12 Pearl street, Boston. An important improvement has just been made in securing the rail to the chairs. It consists in rolling a projection on the outside lower edges of the pendant sides of the rail, which projection is slightly bevelled on its upper edges. Bosses are cast on the sides of the chairs with their lower edges bevelled to correspond with the bevelled projection. By means of a wrought iron clip, which fits over the the bevelled parts on the rail and chair, and a ⅝ inch belt, the sides of the rail and the

WHITE IMPROVED RAIL.

chair are drawn together very solidly and the rail is held down firmly on the chair. The rail cannot work loose with this arrangement. An advantage which will be appreciated by street railway people, is that, as there are no holes needed in the rails, chairs may be placed at any points, doing away with the necessity of locating sleepers at exactly stated intervals as has to be done when the belts for securing the rails have to pass through the rails themselves.

— It is stated that the Edison Electric Light Company has about concluded to locate its Western plant in Milwaukee, conditioned upon securing a franchise from the Common Council to lay underground wires in the streets. They expect to put in works costing $500,000, and will manufacture dynamos and electric motors.

**$$$. RESPONSIBLE PARTIES** wishing to make incandescent lamps can secure a man, fully up in the whole process. No patents, no experimenting, and will instruct or assist those in trouble.

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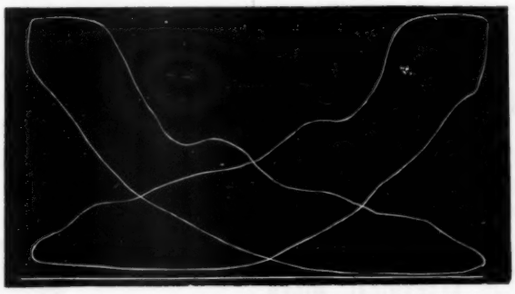

FIG. 2.—INDICATOR DIAGRAM. WILLIAMS ENGINE.

The French Cable Company has been amalgamated with the Mackey-Bennett Commercial Cable Company, and it is proposed to build a cable from Carso to Boston as soon as possible in order to give another independent outlet. Manager G. C. Ward is now in Carso looking after the matter, and arrangements have been perfected with the Canadian Pacific Telegraph Company system to build to Carso and Halifax. The new line of the Postal Telegraph Cable Company has been completed as far as Richmond, Va., and within 60 days all the large cities in the South as far as New Orleans will be in the system. This company handles business very rapidly, sending and receiving answers from Boston, Buffalo and Cincinnati in form five to seven minutes. There are 13 branch offices in Baltimore, with a central office in Neal Building, corner Baltimore and Holiday streets, thoroughly equipped with all the latest improvements. The company uses only copper wire, and is reliable in every particular. A new line is in process of construction to Chicago to meet the demands of the increasing business.

PROPOSALS for the construction and erection of a Police Patrol Telegraph and Telephone System. Office of the Commissioners, D.C., June 27, 1889.

Sealed proposals will be received at this office until 12 o'clock, M., on Monday, July 15th, 1889, for the construction and erection of a Police Patrol Telegraph and Telephone System in the City of Georgetown, District of Columbia.

Blank forms of proposals and specifications can be obtained at the office of the superintendent of the Telegraph and Telephone Service, cor. 5th and D Sts., N. W., Washington, D.C., upon application therefor, together with all necessary information, and bids upon these forms only will be considered.

The right is reserved to reject any or all bids or parts of bids.

J. W. DOUGLASS, L. G. HINE, CHAS. W. RAYMOND, *Commissioners, E. C.*

**FOR SALE.**—Two Z 55 Volt Edison Dynamos, 1 Resistance Box, 250 Lamp Sockets, besides Chandeliers, Lamp Posts and other attachments. All in first-class order; will be sold at a sacrifice, having no use for the above articles. Call or address

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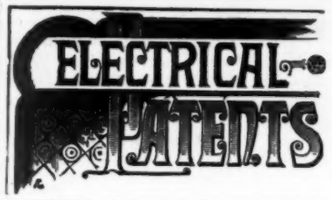


INDEX OF INVENTIONS FOR WHICH LETTERS PATENTS OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING JULY 9, 1889.

406,406 Telegraph pole; Charles M. Russell, Bowling Green, Ky., assignor of one-third to Thomas P. Lyne, same place.

406,415 Dynamo; William S. Andrews, New York, N. Y., and Thomas Sprucer, Westbrook, Ct.

406,420 Electric railway switch; Francis O. Blackwell, New York, N. Y.

406,421 Electric railway circuit; Josiah L. Blackwell, New York, N. Y.

406,423 Signaling apparatus for elevators; J. F. Bower, Chicago, Ill.

406,429 Dynamo armature; Stanley C. C. Currie, Philadelphia, Pa., assignor to the United Electric Improvement Company, Gloucester, N. J.

406,439 Secondary battery; William W. Griscom, Haverford College, Pa., assignor to the Electrical Accumulator Company, of New York.

406,468 Electrical switch; Joseph A. Powers, Lansingburg, N. Y.

406,469 Connection box; Joseph A. Powers, Lansingburg, N. Y.

406,489 Telegraph key; Henry A. Waldo, Reno, Nev.

406,492 Armature winding for dynamos; James J. Wood, Brooklyn, N. Y.

406,493 Self-regulating dynamo; James J. Wood, Brooklyn, N. Y.

406,494 Regulator for dynamo-electric machine; James J Wood, Brooklyn, N. Y.

406,498 Incandescent lamp; Chas. A. Backstrom; New York, N. Y.

406,567 Telephone. 406,568 Phonograph. 406,569 Phonogram blank. 406,570 Phonograph. 406,571 Process of treating phonogram blanks. 406,572 406,573 406,574 406,575 Automatic Determining device for phonographs. 406,576 Phonogram blank; Thomas A. Edison, Llewellyn Park, N. J.

406,599 Dynamo electric machine; William L. Silvey, Lima, Ohio.

406,600 Electric railway motor; Frank J. Sprague, New York, N. Y., assignor to Sprague Electric Railway Company, same place.

406,629 Electric horse disconnector; Geo. A. Coulter, Omaha, Neb., assignor of one-half to James C. Ish, same place.

406,636 Galvanic battery; Matthew Dongans, Worcester, Mass., assignor of one-half to Edward P. King, same place.

406,656 Galvanic battery; Frederick Lotz, New York, assignor by direct and mesne assignments to J. A. Amundson, same place.

406,678 Recording apparatus for electric meters; Geo. W. Walker, New York, N. Y.

406,709 Invisible burglar alarm electric mat; James W. Dawson, St. Louis, Mo.

406,748 Electric railway; Walter H. Knight, New York, N. Y.

406,751 Electrical apparatus for regulating steam boilers; François Martenot, Paris, France.

406,769 Signal or alarm transmitter and time indicator, Andrew J. Reams, El Dorado, Kans.

406,771 Secondary battery electrode; Andrew L. Riker, New York, N. Y.

406,777 Armature for electric machines; Albert Schmid, Pittsburgh, Pa.

406,797 Closed slotted conduit for electric railways; C. J. Van Depoele, Lynn, Mass.

406,804 Electric railway; David G. Weems, Baltimore, Md., assignor to Electro-Automatic Transit Company, same place.

406,805 406,806 Electric railway; David G. Weems, Baltimore, Md.

406,818 Underground conduit for electrical conductors; Geo. W. Cook, Detroit, Mich., assignor of one-third to C. C. Canny, same place.

406,824 406,825 Electric meter; Thos. A. Edison, Menlo Park, N. J., assignor to Edison Electric Light Company, New York, N. Y.

406,833 Means for propelling vehicles by secondary batteries; William W. Griscom, Haverford College, Pa.

**TRUSTEE'S SALE**

In the matter of the dissolution of The Partz Electric Battery Company, Court of Common Pleas, No. 2, Philadelphia County, March Term, 1889, No. 894.

**ON TUESDAY, JULY 30th, 1889,**

—AT THE—

Philadelphia Exchange, cor. 3d & Walnut Sts., Phila.,

at 12 o'clock, will be sold at public sale,

**Letters Patent of the United States**

AS FOLLOWS:

No. 251,619, issued January 24, 1882, to A. F. W. Partz, for improvement in Voltaic Batteries.

No. 328,607, issued October 20, 1885, to A. F. W. Partz, for improvement in Liquids for Voltaic Batteries.

No. 347,440, issued August 17, 1886, to A. F. W. Partz, for improvement in Voltaic Batteries.

No. 353,757, issued December 7, 1886, to A. F. W. Partz, for improvement in Voltaic Batteries.

No. 362,531, issued May 10, 1887, to A. F. W. Partz, for improvement in Voltaic Batteries.

No. 379,180, issued March 6, 1888, for improvement in Depolarizing Compounds.

ALSO, at the same time and place, will be sold for the same account, certain other assets.

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One 30 light Brush machine and 1,200 c. p. lamps in good order.

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Large Lot of Weston machines with lamps, all sizes. Sold very cheap.

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Will furnish on order second-hand apparatus of any system. Write for further information.

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**WANTED.**—Engineer capable of taking charge of central station, containing Ball Engine and two half arc Brush Dynamos. Run on moon schedule. Write, stating experience, references and salary expected. Address,

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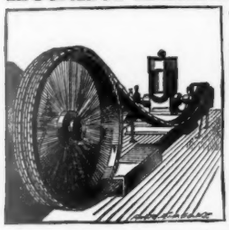

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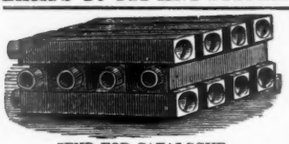

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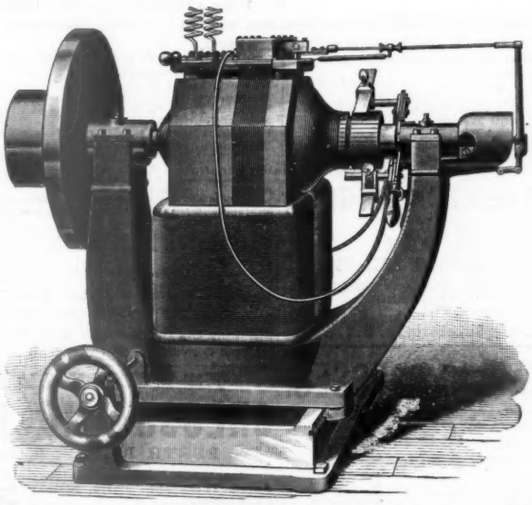

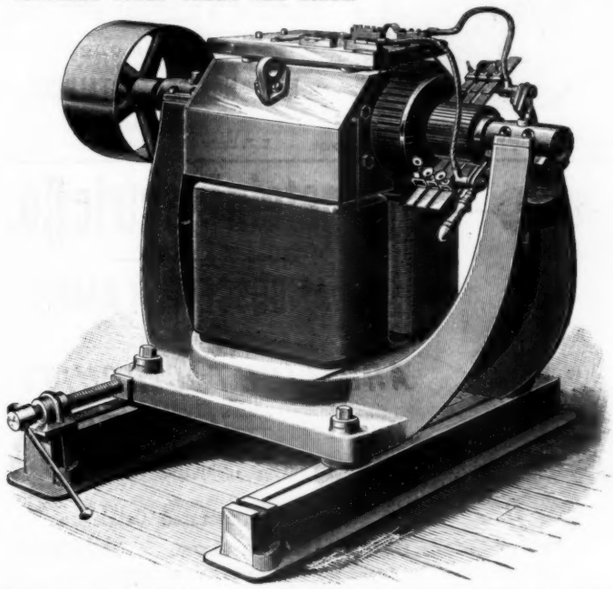

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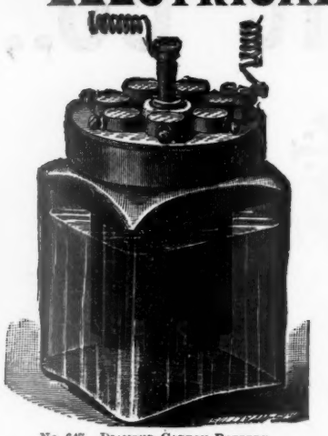

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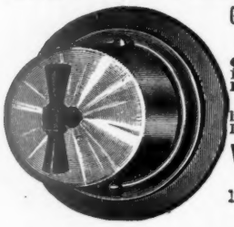

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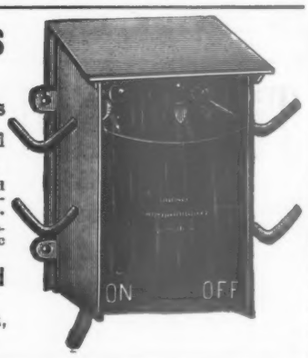


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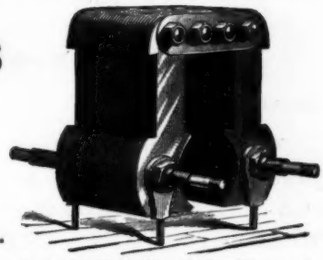

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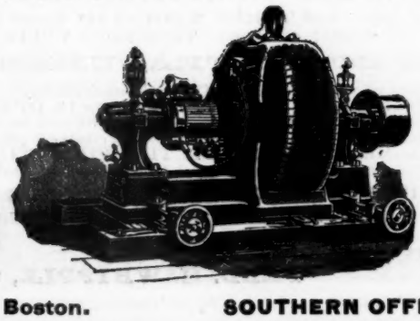

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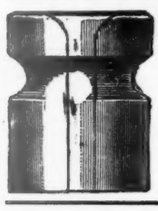

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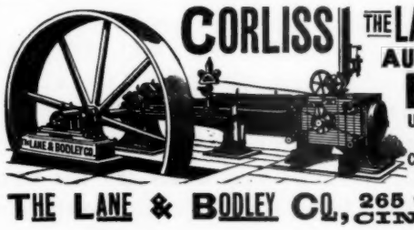


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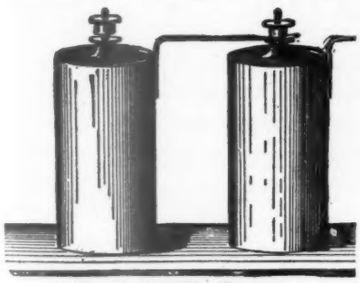

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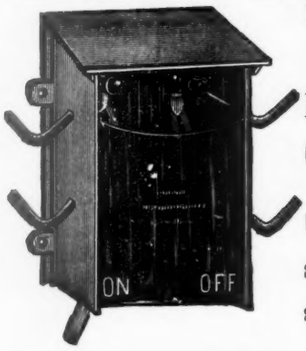


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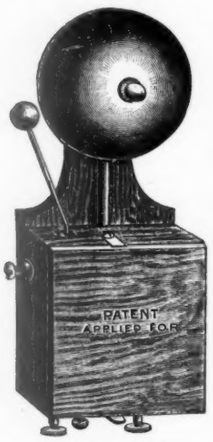


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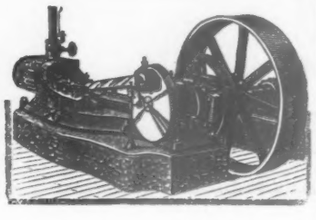

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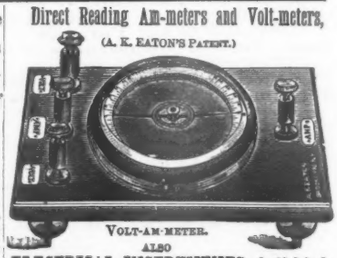

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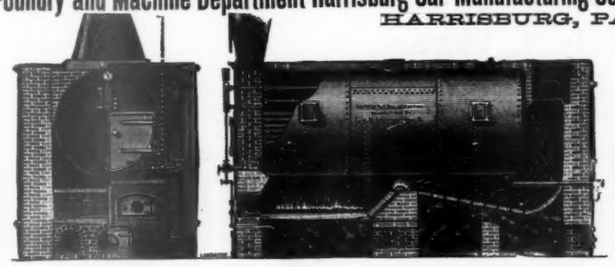

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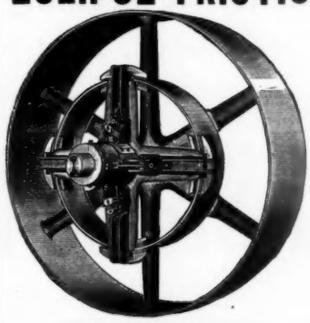

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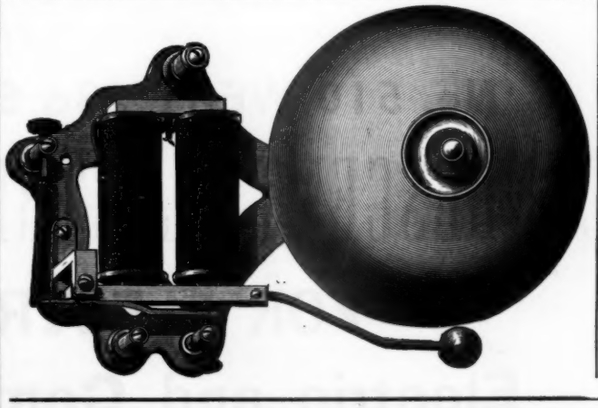

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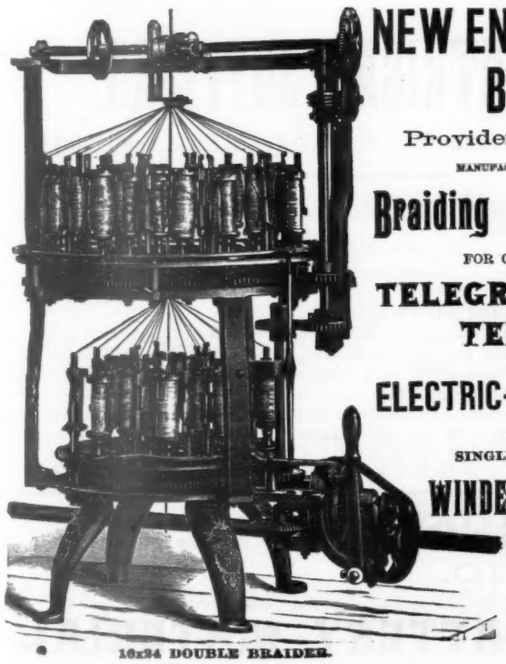

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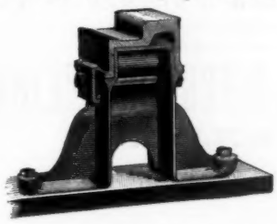

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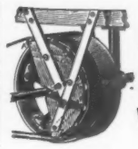

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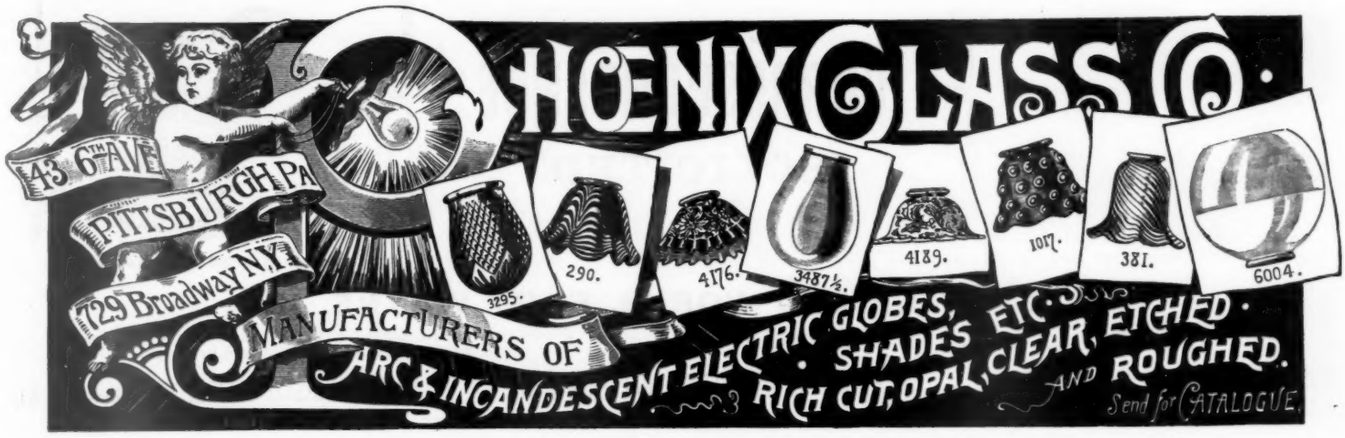


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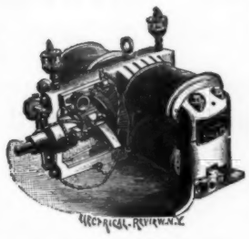

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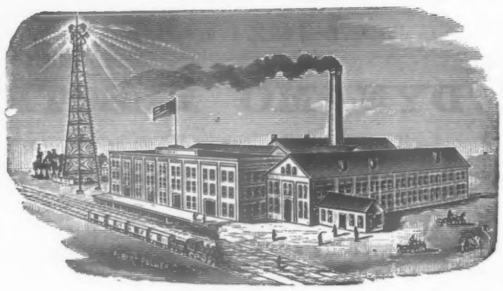

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